



Lead Poisoning in Opium Addicts in Shahid Rajaei Hospital of Karaj, Iran

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Received: August 7, 2023
Revised: August 16, 2023
Accepted: August 25, 2023
Published: August 29, 2023

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Abstract

Background: Lead (Pb) is a heavy metal that can harm major organs in humans, and its high serum levels can cause poisoning. In Iran, one of the major causes of Pb poisoning is opium consumption because drug dealers combine opium with henna, a plant extract color; Pb is added to this plant for the fixation of its color. Considering that henna makes opium heavier, it costs more, and none of the users can differentiate opium from henna as their color is the same. According to the statistics of the Iranian Ministry of Health and Medical Education, 2.3% of people between the ages of 15 and 60 are drug addicted, of whom 69% to 94% have opiate addiction. Regarding these issues, it seems necessary to study the serum level of Pb in Iranian addicts.

Objectives: The status of the serum Pb level and Pb poisoning symptoms among opium addicts was investigated in this study.

Materials and Methods: In this study, all addicted patients were selected based on their history of using opium who were referred to the emergency department of Shahid Rajaei Hospital in Karaj (Center of Alborz province in Iran) and were evaluated between March 2016 and September 2016. Blood samples were collected from patients to measure serum Pb levels with atomic absorption by a Perkin device (USA) and evaluate basophilic stippling of red blood cells (RBCs) in a peripheral blood smear under a light microscope. The clinical signs and symptoms of patients were evaluated in several fields. They included neurological problems (including headache, memory impairment, sensory impairment, muscle weakness, seizure, and decreased consciousness), gastrointestinal (GI) problems (including constipation, nausea and vomiting, abdominal colic pain, and anorexia), and general signs and symptoms (including myalgia, fatigue, and the presence of a Pb line on the gum).

Results: During the study, 75 patients with opium addiction were enrolled, including 67 (89.3%) males and 8 (10.7%) females. The mean age of patients entering the study was 52 years. Of these patients, only one case (1.3%) used opium by inhalation, and the remaining 74 cases (98.7%) had oral addiction. The mean serum Pb level among these patients was 57.7 µg/dL (the lowest and highest levels were 0.2 and 193 µg/dL, respectively). Of these 75 patients, the serum level of 15 cases (20%) was less than 15 µg/dL, and that of 60 (80%) cases was greater than 15 µg/dL. Of all the patients, the one who had the highest serum levels of Pb (193 µg/dL) went through a seizure, lost consciousness, and died. In general, GI signs and symptoms were more common among patients than any other signs and symptoms.

Conclusion: The findings of this study could reveal the most common complications of Pb poisoning in addicted patients, but no relationship was found between rare complications and Pb poisoning level.

Keywords: Opium, Lead poisoning, Signs, Symptoms, Serum lead levels

Background

Lead (Pb) is considered a heavy metal, and high Pb serum levels can lead to poisoning. The symptoms of Pb poisoning are mostly non-specific and include gastrointestinal (GI), neurological, and general symptoms.¹ The signs and symptoms of Pb poisoning were first described 2000 years ago. Common symptoms include constipation, anemia, abdominal pain, and anxiety,²⁻⁴ and uncommon symptoms are muscle pain, headache, anorexia, decreased

libido, sleep disorders, seizures, and encephalopathy.^{3,5,6} Pb also creates a special gingival line and a basophilic stippling of red blood cells (RBCs).⁵ Serum Pb levels and patient symptoms have been investigated in several studies published as case reports.^{6,7} Pb poisoning can be acute or chronic.^{8,9} The symptoms of Pb poisoning depend on a variety of factors, such as age and serum Pb levels, and different individuals have different responses to the same serum Pb levels.¹⁰



In 2009, the Centers for Disease Control and Prevention of the United States decreased the toxic serum level of Pb from 25 mg/dL to 10 mg/dL.^{7,9} In the United States and Western countries, Pb poisoning is more likely to be due to occupational exposure.¹¹⁻¹⁴ In many studies, drugs of traditional Indian and Chinese medicine are known as the cause of Pb poisoning as well.^{1,15}

Opium consumption is one of the major causes of Pb poisoning in Iran because drug dealers combine opium with henna, a plant extract color. Pb is added to it for the fixation of its color because henna makes opium heavier, and therefore it costs more. Thus, none of the users can differentiate between opium and henna as their color is the same. Opium consumption is one of the major causes of Pb poisoning.^{4,5,8,15-17} In Middle Eastern countries, especially in Iran, opium addiction is one of the most common forms of drug addiction.¹⁵ According to the statistics of the Iranian Ministry of Health and Medical Education, 2.3% of the people between 15 and 60 years old are addicts, of whom 69%–94% have opiate addiction.^{4,18} In Iran, drug traffickers add Indian henna to opium to increase its weight. Indian henna contains Pb compounds to stabilize henna color; this Pb causes toxicity in opium users.¹⁵ The other causes of Pb poisoning include industrial contamination, soil, and car exhaust fumes, which can enter the human body through various routes such as inhalation, ingestion, or skin contact.^{8,12} Regarding these issues, studying the serum level of Pb among Iranian addicts is necessary. Therefore, this study evaluated the status of the serum Pb level and Pb poisoning symptoms among opium addicts.

Materials and Methods

In this study, all addicted patients who were referred to the emergency department of Shahid Rajaei hospital in Karaj (Center of Alborz province in Iran) were selected by the research team based on their history of using opium and evaluated from March 2016 to September 2016. Patients were excluded from the study if they had an addiction to other substances such as heroin, glass, and cannabis. Initially, all patients were informed about the study, and consent was obtained from them. Blood samples were collected from patients for the measurement of serum Pb levels with atomic absorption by a Perkin device (USA) and the evaluation of the basophilic stippling of RBCs under a light microscope. The clinical signs and symptoms of patients were evaluated in terms of neurological (i.e., headache, memory impairment, sensory impairment, muscle weakness, seizure, and decreased consciousness) and GI (i.e., constipation, nausea and vomiting, abdominal colic pain, and anorexia) problems and general signs and symptoms (i.e., myalgia, fatigue, and presence of a Pb line on the gum). The demographic data of patients, including age, gender, smoking, and type of addiction (oral or inhalation), were studied as well.

Data Analysis

SPSS (version 22) software and the independent *t* test were used for statistical analysis of various signs and symptoms and serum Pb levels in patients.

Results

In general, 75 patients with opium addiction were enrolled during the study [67 (89.3%) males and 8 (10.7%) females]. The mean age of patients entering the study was 52 years, with 21 years as the lowest age and 96 years as the highest age. Of these patients, only one (1.3%) consumed opium by inhalation, and the remaining 74 patients (98.7%) had oral addiction.

The mean serum Pb level among these patients was 57.7 µg/dL (lowest 0.2 and highest 193 µg/dL). Of these 75 patients, the serum level of 15 patients (20%) was less than 15 µg/dL, while that of 60 cases (80%) was greater than 15 µg/dL. Of all patients, the patient who had the highest serum levels of Pb (199 µg/dL) had a seizure and loss of consciousness and died. The average age of the patients in this study was 52 years, which is higher than the mean age of drug addiction in Iran. This is because the average age of opium use in Iran is higher than that of addiction to other drugs. Of the 75 patients who entered the study, 67 (89.3%) were males and 8 (10.7%) were females. This may be indicative of a higher prevalence of opium addiction among men in the community. Overall, 74 out of 75 patients who entered the study consumed opium orally (98.7%), and only one patient (1.3%) used opium by inhalation of GI signs and symptoms. In general, GI signs and symptoms were more common among patients than any other signs and symptoms. The details are described in Figure 1.

Constipation

Twenty patients (26.7%) had constipation, the second most common symptom of GI symptoms and the third most common symptom among all symptoms. The mean serum level of Pb in patients with constipation was 71.56 µg/dL, which was significantly higher ($P < 0.05$) than the serum Pb level in patients without constipation (56.21 µg/dL).

Abdominal Colic Pain

In general, 42 patients (56%) suffered from abdominal colic pain. Colic pain was the most common GI symptom, as well as the most common symptom among other symptoms in patients. The mean serum levels of Pb in patients with and without colic pain were 67.6 µg/dL and 45.1 µg/dL, respectively, which had a significant difference ($P < 0.05$).

Anorexia

Ten patients (13.3%) had anorexia with an average serum Pb level of 71.8 µg/dL. This level was significantly higher ($P < 0.05$) than the serum level in patients without

anorexia (mean level = 55.5 µg/dL).

Nausea and Vomiting

Sixteen patients (21.33%) had chronic nausea and vomiting with a mean serum Pb level of 63.2 µg/dL, which was significantly higher ($P < 0.05$, Figure 1) than those who did not have nausea and vomiting (56.16 µg/dL).

General Signs and Symptoms

Myalgia

Only 4 patients (5.3%) had myalgia with a mean serum Pb level of 50.52 µg/dL. In patients without myalgia, the mean serum level of Pb was 58.1 µg/dL. Differences in the mean levels between these two groups were not statistically significant ($P > 0.05$).

Fatigue

Overall, 11 patients (14.7%) felt fatigue. The mean serum level of Pb in these subjects was 81.22 µg/dL. This mean level was significantly higher ($P < 0.05$) than the mean serum level of patients without fatigue (53.64 µg/dL).

Lead Line in the Gum

None of the patients had a gingival Pb line in oral examinations (Figure 2).

Neurological Signs and Symptoms

In general, neurological signs and symptoms have a lower prevalence than GI signs and symptoms.

Consciousness Level

The most common neurological symptom was decreased consciousness level, which was detected in 28 patients (37.35%). The mean serum level of Pb in these individuals was 93.95 µg/dL and significantly higher ($P < 0.05$) than in other patients (48 µg/dL).

Seizures

Seven patients (9.3%) had generalized tonic-clonic seizures with a mean serum level of 92.88 µg/dL, which was significantly higher ($P < 0.05$) than other patients (54.07 µg/dL).

Other Neurological Symptoms

Other symptoms, including headaches, sensory impairment, and muscle weakness were not found in any patient. Memory impairment was observed only in one patient with a serum Pb level of 33 µg/dL. Balance impairment was seen in two patients with serum Pb levels equal to 78 and 193 µg/dL. The serum levels of Pb in these patients demonstrated no significant difference from other patients ($P > 0.05$, Figure 3).

Peripheral Blood Smears for Basophilic Stippling

Twelve patients (16%) showed basophilic stippling of

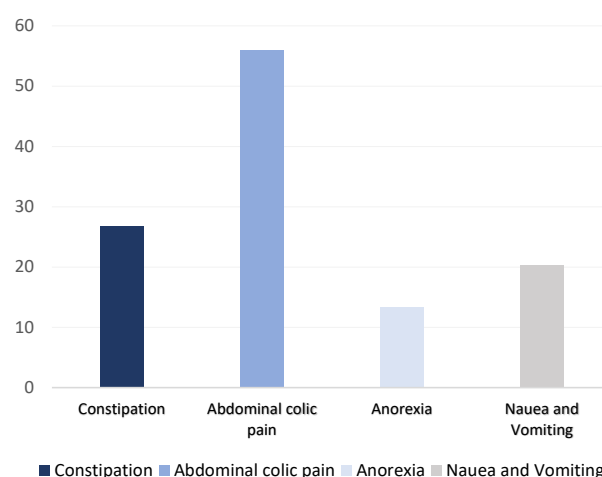


Figure 1. Percentage of Patients Suffering From Gastrointestinal Signs and Symptoms

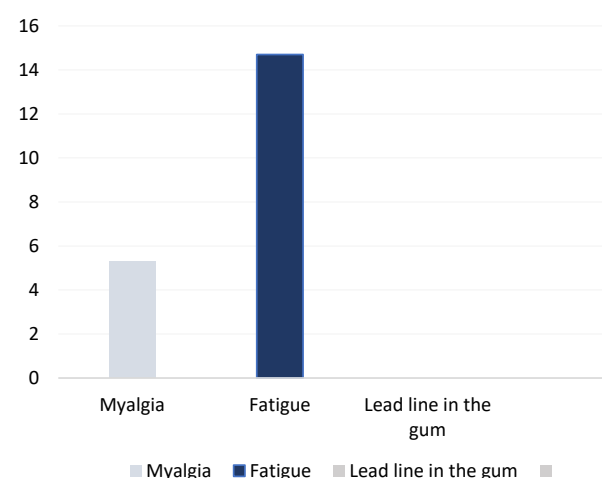


Figure 2. Percentage of Patients Suffering From General Signs and Symptoms

RBCs in the PBS. The mean serum level of Pb in these subjects was 82.05 µg/dL, which was significantly higher ($P < 0.05$) than in other patients (53.05 µg/dL).

Discussion

The prevalence of opium inhalation among opium addicts in the community is extremely higher than oral use (1.3%), indicating that Pb absorption through the intestine (orally) is higher than lung (inhalation). The mean serum level of Pb is about 3–5 times higher than the normal range (10–15 µg/dL). Other studies, such as that of Salehi et al demonstrated an increase in the serum levels of Pb in opium addicts⁸. The death occurred only in one patient due to a neurological Pb poisoning complication (seizure), with the highest serum level of Pb (193 µg/dL) among all patients.

It seems that there is a higher prevalence of GI signs and symptoms among patients than neurological signs and symptoms because GI signs and symptoms reveal lower serum levels of Pb in comparison to neurological signs and symptoms. The most common GI symptom in patients was abdominal colic pain, suggesting that Pb

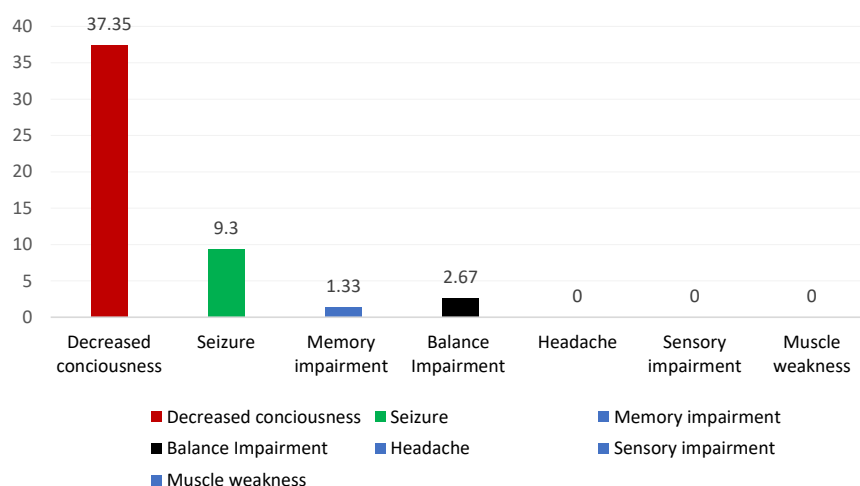


Figure 3. Percentage of Patients Suffering From Neurological Signs and Symptoms

toxicity should be considered a differential diagnosis of abdominal colic pain in patients with opium addiction. Constipation was the second most prevalent GI symptom in our patients, and its prevalence increased with higher serum levels of Pb. Constipation is a well-known and highly prevalent complication of narcotics itself (in addition to the effects of opium on the narcotic receptors of the alimentary tract that cause constipation); this phenomenon can be confused with constipation due to Pb poisoning. To differentiate between these two conditions, it is recommended that the serum Pb level be measured in opium addicts suffering from constipation to diagnose constipation due to Pb poisoning in these patients. Considering the high prevalence of nausea and vomiting in our patients (approximately 21%) and the increased prevalence of nausea and vomiting in patients with higher serum levels of Pb, it is suggested that physicians measure the serum levels of Pb in opium addicts who suffer from nausea and vomiting.

Serum levels of Pb in these patients were significantly higher than in other patients, indicating that the presence of basophilic stippling is suggestive of higher serum levels of Pb and more severe toxicity; however, the absence of this mark in the PBS does not rule out Pb poisoning. The line of Pb deposits in the gum did not exist in any patient, even at high serum levels of Pb. This finding suggests that the clinical value of the search for this mark in examinations is extremely low. A feeling of fatigue was also observed in patients with high serum levels of Pb, highlighting the relationship between these two issues. On the other hand, there was no relationship between myalgia and serum Pb levels in the patients, which undermined the presence of myalgia as a clinical symptom in suspected Pb toxicity in opiate addicts. Among the neurological signs and symptoms, the most common findings were loss of consciousness and then seizures. This recommends that in opiate addicts with loss of consciousness or unexplained seizures, physicians should measure serum Pb levels.

The presence of these signs indicates severe Pb

poisoning. There was no case of headache, sensory impairment, muscle weakness, memory loss, or balance impairment in our patients. According to these findings, the prevalence of these signs and symptoms in the Pb poisoning of opium addicts is extremely low, and these signs and symptoms are not good indicators of Pb poisoning in opium addicts.

Conclusion

Many studies have been published about Pb poisoning in opiate addicts,^{4,8,11,16,18-21} often including case reports and case series. This study was designed when there was an epidemic of Pb toxicity among addicts in Karaj. There might be other clusters of toxicity in other parts of Iran. We have studied the most common complications of Pb toxicity in addicted patients. Although there may be rare complications that we could not evaluate because of the number of our samples.

Acknowledgements

The authors would like to thank the Clinical Research Development Unit (CRDU) of Shahid Rajaei Hospital, Alborz University of Medical Sciences, Karaj, Iran for their support, cooperation and assistance throughout the period of study.

Authors' Contribution

Conceptualization: Behnaz Movahedi.

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Funding acquisition: Behnaz Movahedi.

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Visualization: Shokufeh Zamani.

Writing—original draft: Behnaz Movahedi.

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Competing Interests

The authors declare that they have no competing interests.

Data Availability Statement

All data generated or analyzed during this study are included in this published article (available).

Ethical Approval

All the authors and the patient agreed to publish this article, and the Ethics Committee of Alborz University of Medical Science approved it (Project number: IR.ABZUMS.REC.1397.071). Written informed consent was obtained from the patients for the publication of this article and any accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal.

Funding

This study was financially supported by Alborz University of Medical Science.

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