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Relationship of serum lead level in patients consuming oral opium with abdominal pain

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Abstract

Introduction: Drug abuse and its complications are the health-social problems in Middle East countries like Iran. Smugglers may add lead to the drugs when it is produced, to increase its weight.
Objectives: The main purpose of current study is to investigate the relationship of serum lead level with abdominal pain in the patients consuming oral opium.
Patients and Methods: In this cross-sectional study, 122 patients consuming oral opium presented with abdominal pain referring to three university hospitals (2016) were investigated. Serum lead levels were measured in all of the subjects. Using the checklist, the patients' information including demographic data and other information were collected.
Results: Average age of patients was 13 ± 49.25 years (98 percent were males). The average serum lead level in oral opium users with abdominal pain complaint was 87.49 ± 32.27 mg/dL. In our patients, 3.3% had mild toxicity (25 to 45 mg/dL), and 29.5% of individuals were at moderate toxicity level (45-69 mg/dL). Accordingly, 39.3% of patients had severe lead toxicity (70-100 mg/dL). Moreover, in 27.9% of subjects, the lead level was over 100 mg/dL, which was at the severe poisoning level. The most common symptom with abdominal pain was constipation in 72% and anorexia in 53% of individuals.
Conclusion: Our results indicated the high level of serum lead in addicts of oral opium in our study population. Thus, screening the serum lead level in drug addicts is useful for preventing opium complications.

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Introduction

Lead is a heavy metal that is found in nature, and can cause chronic or acute poisoning. Contact with lead through ingestion, inhalation, or skin contact can cause poisoning. Clinical manifestations of non-specific lead poisoning include non-specific abdominal pain, constipation, irritability, muscle aches, headache, anorexia, sexual desire loss and disturbance of concentration (1,2). Non-specific abdominal pain in these cases can be confused with cholecystitis, pancreatitis, and acute abdomen. In these cases, gastrointestinal examinations and even unnecessary surgeries may be conducted (3-8). In recent years, there have been numerous reports of lead-related poisoning in opium addicts. Drug abuse and its complications are the health-social problem in Middle-East countries like Iran (9). In addition, presence of non-specific symptoms in the drug addicts mimics the symptoms of lead poisoning. On the other hand, prevalence of various symptoms including mental diseases or symptoms that imitate diseases such as cholecystitis, pancreatitis, and non-specific abdominal pains are high in drug addicts (10-15). Most of patients with the symptoms related to lead poisoning who referred to the hospitals were consumers of oral opium. Addition of the lead to opium causes acute lead poisoning. It causes increasing of complications and even mortality, and also creates irreparable injuries. It seems that implementation of a purposeful care plan can significantly reduce mental burden and the subsequent problems and complications of this phenomenon (16).

Objectives

Considering high prevalence of oral opium usage among Iranians, the current research was designed and conducted to investigate the relationship between serum lead level in patients consuming oral opium with abdominal pain referring to our three hospitals.

Patients and Methods

Study design

In this cross-sectional study, 122 patients consuming oral opium with abdominal pain

Core tip

In a cross-sectional study on 122 patients consuming oral opium presented with abdominal pain, we found, high levels of serum lead level. The most common symptom with abdominal pain was constipation in 72% and anorexia in 53% of individuals. Findings of the current study suggested that high concentration of serum lead in the oral opium addicts in the population under our study. In addition, our study supports the diagnosis of lead poisoning as the justifying factor for the symptoms in the addict patients referring with non-specific symptoms including abdominal colic, nausea, vomiting, weight loss, anemia, and neuropathy.

referring to Rasoule-Akram, Firoozgar, Hafte-Tir and Baharloo hospitals (2016) were investigated. Serum lead levels were measured in all of them. Using the checklist, the patients' information including demographic data, health status, and life style were collected too. The individuals who work in battery-making factories, or jobs such as soldering, wiring, potting, ammunition, radiating, and painting were excluded.

Ethical issues

Human rights were respected in accordance with the Helsinki Declaration 1975, as revised in 1983. The ethical committee of Iran University of Medical Sciences (Ethical Code; IR.IUMS.FMD.REC1396.9411307035) approved the study. The informed consent was taken from the patients as well as from parents and first relatives. Additionally, this paper was extracted from the residential thesis of Zeinab Neghabi with number 4965 in Iran University of Medical Sciences.

Statistical analysis

The data were analyzed by IBM SPSS 23 statistical package (SPSS Inc, Chicago, and IL.USA). For data analysis, central indices and dispersion indices were used. Tables and charts were used to show the results.

Results

Average age of patients was 49.25 ± 13 years, (98% were males and 2% were females). The average of serum lead level in oral opium users with abdominal pain was 87.49 ± 32.27 mg/dL. The minimum serum lead level in these patients was 26 mg/dL and the maximum level was 182 mg/dL. The level of lead in oral opium were as follows; 0.0% of them were below 25 mg/dL (non-toxic), 3.3% had mild toxicity (25 to 45 mg/dL). In 29.5% of participants, the lead level was at moderate toxicity level (45-69 mg/dL), while 39.3% of patients had a severe toxicity (70-100 mg/dL). Finally, in 27.9% of subjects, the serum lead concentration was over 100 mg/dL, which was at the severe poisoning level. Figure 1 indicates serum lead level in patients consuming oral opium referring with abdominal pain. The symptoms observed in the patients included decreased appetite, constipation, nausea and vomiting, anemia, weight loss, gum involvement, foot swelling, and joint pain, with the highest frequency of constipation of

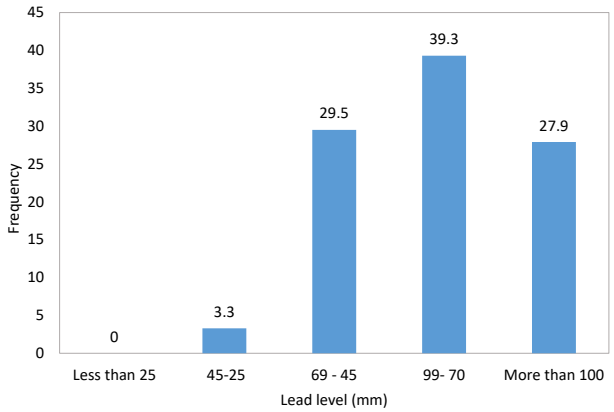

Figure 1. Serum lead level in patients consuming oral opium referring with abdominal pain

72% and then anorexia with 53% of subjects. Duration of consumption of oral opium in patients ranged from one to over five years.

Average plasma hemoglobin in patients using oral opium with abdominal pain was 10.94±1.957 g/dL. Minimum hemoglobin in these patients was 7 g/dL and maximum level was 18.70 g/dL. Range of hemoglobin in different serum lead levels in patients using oral opium referring with abdominal pain is shown in Figure 2.

Average hematocrit in patients using oral opium with abdominal pain was 33.19 ±5.414%. The minimum level of hematocrit in patients was 22.50 % and its maximum level was 54.20%. The average MCV in patients using oral opium with abdominal pain was 81.91 ±8.979 fl. Accordingly the average SGPT in patients using oral opium with abdominal pain was 49.76 U/L. Minimum level of SGPT in these patients was 5.00 U/L and its maximum level was 324.00 U/L. The range of SGPT in different serum lead levels in patients using oral opium referring with abdominal pain is shown in Figure 3. Average WBC in patients using oral opium referring with abdominal pain was 10.24±3.395 $\times 10^3/\mu L$, while, the average PLT was $268.4\times 10^3/\mu l$. Additionally, the average BUN was 18.239±33.83 mg/dL, and average SGOT was 43.47±42.372 U/L.

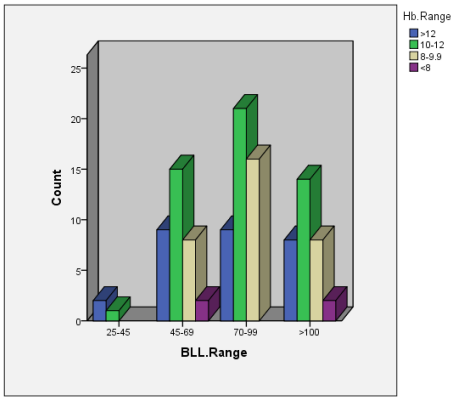

Figure 2. Range of Hb in different serum lead levels in patients using oral opium referring with abdominal pain.

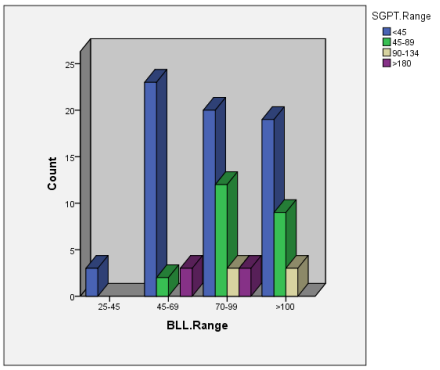

Figure 3. Range of SGPT in different serum lead levels in patients using oral opium referring with abdominal pain.

Discussion

Poisoning with lead has been recognized thousands of years ago, and it still exists. The lead is one of the heavy metals that can act as a chronic or acute toxic factor. The non-organic lead is absorbed from the lungs and the gastrointestinal tract, and accumulates in the blood, soft tissue, and bone. Clinical symptoms of poisoning with lead completely vary from the individual to the individual. Poisoning with lead influences central and peripheral nervous systems, kidney function, vascular system and digestive system, causing anemia, kidney damage, and neuropathy and digestive tract symptoms (17). In cases of moderate and chronic exposure, most of the symptoms of central nervous system involvement and symptoms associated with nephropathy are observed (18). In adults, elevated serum lead level is mainly due to occupational exposure (19). Due to increased knowledge in the working environments over recent years, occupational poisoning with lead has been increased globally, since a new form of non-occupational poisoning has been emerged (20). Hence, a new type of poisoning with lead due to using opium polluted with the lead is gradually emerging in our region (21). Drug abuse and its adverse effects are among the major health problems in the Middle-East countries including Iran. The addiction pattern is changing toward high-risk methods and materials. The drug suppliers and users may add lead for increasing the weight for opportunistic reasons during the drug preparation process. Several pathological findings such as abdominal pain, neuropathy, and anemia have been reported in opiate addicts. Such findings could indicate lead poisoning in these individuals, suggesting the importance of screening in these individuals for lead potential poisoning. According to the significant difference in the average level of serum lead in the populations of different regions, there is a need for such studies in our region (22). A recent case report by Fatemi et al (10), discussed a 25-year old man referred with abdominal pain, progressive nausea and vomiting from about two months before refereeing with 7 kg of weight loss. The patient also complained about generalized bone pain, especially lumbar and jaundice in eyes. The patient had a long history of oral and inhalation of drug abuse. In the physical examination, jaundice and pale mucus were seen and in the mouth examination, the black pigmentation was seen in the margin of the gum. Lymphadenopathy was not observed. In the gastrointestinal tract examination using endoscopic method, the upper gastrointestinal tract was reported as normal. In the tests, hepatic aminotransferases increased, but alkaline phosphatase was normal. Indirect bilirubin also increased. In the blood tests, non-immune anemia, hemolytic anemia was reported and direct and indirect coombs were negative. The patient also had a history of smoking and oral drugs abuse from about six years before admission. Serum lead level was 350 mg/dL level, which considered very high level. At the same time, the lead level in the abused drugs was also reported to be high. The patient was treated with calcium British anti-lewisite (BAL) and calcium disodium EDTA (ethylenediaminetetraacetic acid), while the symptoms were improved with gradual reduction of the serum lead level. Similar cases of the disease due to consumption of oral opium containing lead have been reported in Iran (10). As reported by the study of Salehi et al (11), drug abuse and its complications are one of the health-social problems in the Middle-East countries including Iran. Smugglers may add lead to the drugs when it is produced, for increasing its weight. In addition, presence of non-specific symptoms in the drug addicts mimics the symptoms of lead poisoning. There are limited numbers of reports for lead poisoning resulting from drug abuse. However, in the area of available medical resources, this is the first study that compares serum lead level in the drug addicts and healthy individuals.

The previous study conducted in the addiction treatment center of Moradi hospital of Rafsanjan University of Medical Sciences (2007-2008). Serum lead level was investigated in 44 samples in case and control groups with average age of 6.7±38.8 years. The case group included individuals (n=22) that consumed oral opium. The control group (n=22) was homogenized regarding age and gender with the case group considering the exclusion criteria. The difference between two groups was statistically significant ($P<0.001$). This study showed no significant relationship between the duration of abuse and the serum lead level. Salehi et al found a significant increase in serum lead level in drug addicts compared to control group. Therefore, screening of serum lead concentrations in drug addicts, especially with non-specific complaints is useful (11). The study by Wolf et al showed that abused drugs are potential sources for the lead poisoning. In their study, blood lead levels in the patients' group were higher than those in the case group. In addition, there was an association between blood lead levels in the addict patients and the level of abused drugs. Both groups were homogenized, and the only difference was oral opium usage. Therefore, increase in blood lead levels in the case group can be result of the drug polluted with the lead. Almost 40 percent of the patients had toxic level of lead and the serum lead level in the

participants was higher than 25 µg/dL (13). Additionally, the study by Anderson et al showed high blood lead levels can justify the clinical findings of drug addicts. They suggested, screening of serum lead concentrations in drug addicts, especially with non-specific complaints, is useful (15).

In our study, all patients with abdominal pain had serum lead level higher than 25 µg/dL (toxic level) in 100% of the patients. We found no significant relationship between hemoglobin range with different lead levels in the patients using oral opium referring with the abdominal pain (P = 0.415). There was no significant relationship between hematocrit range with different lead levels in the patients using oral opium referring with the abdominal pain (P = 0.096). There was no significant relationship between MCV range with different lead levels in the patients using oral opium referring with the abdominal pain (P = 0.592). There was no significant relationship between SGPT range with different lead levels in the patients using oral opium referring with the abdominal pain (P = 0.755). There was also no significant relationship between duration of drug abuse at different lead levels in the patients using oral opium referring with the abdominal pain (P = 0.103). Moreover, a significant relationship between quantity of drug abuse with different lead levels in patients using oral opium referring with the abdominal pain was seen (P = 0.010).

Conclusion

Findings of the current study suggested that high concentration of serum lead in the oral opium addicts in the population under our study. In addition, our study supports the diagnosis of lead poisoning as the justifying factor for the symptoms in the addict patients referring with non-specific symptoms including abdominal colic, nausea, vomiting, weight loss, anemia, and neuropathy.

Recommendation

Considering that the lead poisoning costs and outcomes can be reduced by reduction and elimination of exposure resource and early diagnosis of high serum lead level, the clinicians of primary care should play an active role in prevention and early diagnosis of patients exposed to the recognized exposure with the lead.

Limitations of the study

Non-cooperation of patients for participation in the study and data collection.

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Authors' contribution

NZ and HA designed the study, observed the accuracy and validity of the study. NZ collected the data and follow the study. AA and SHSH supervised the project. NZ and HA wrote the paper. All authors edited and revised the final manuscript and accepted its publication.

Conflicts of interest

The authors declared no competing interests.

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