Comparing Blood Lead Level among Oral/inhaled Opium Addicts with a Non-addict Control Group in the Southeast of Iran

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Original Article

Abstract

Background: Opium is widely used among addicts in the Middle East countries such as Iran. Recent reports suggest that opium sellers cheat their customers by adding lead to the opium. Contaminated opium can threaten the health of consumers. This study was designed to evaluate the lead concentration in blood sample of oral and inhaled opium user's referring to Amir Al-Momenin Hospital in Zabol, Iran, during spring 2015 in comparison with those of control group.

Methods: Blood lead level (BLL) of 188 subjects with a mean age of 52.06 years in three categories - including oral opium addicted (55 patients), inhaled opium addicted (55 patients), and healthy control group (n = 78) - was assessed. The BLL of all the subjects was assessed using an atomic absorption spectrophotometer.

Findings: Almost all participants consumed "Tariak" (99.09%). Mean ± standard deviation (SD) duration of opium addiction was 13.21 ± 10.26 years. The average blood lead concentration among oral users, inhaled users, and control group were 34.31 ± 21.54, 41.13 ± 26.40, and 9.86 ± 4.40 µg/dl, respectively (P = 0.001).

Conclusion: Our study showed significant differences of BLLs between opium users and control group. We also did not find any association between blood lead concentration and method of opium consumption.

Keywords: Blood lead level; Opium; Addict

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Introduction

Nowadays, lead is widely used in the human life.[1] It is a component of different equipment such as home appliances, cosmetics, toys, and colors. This element is the main source of food, air, and water contamination.[2-5]

Lead can enter into the body from different routes, particularly gastrointestinal and respiratory systems. It can be transported to different body organs during several months.[6-11]

In addition to routine sources of lead exposure, evidence of lead poisoning has been reported among opium consumers.[12-15] Lead poisoning is manifested by different signs and symptoms such as nonspecific abdominal pain, irritability, myalgia, constipation, headache, anorexia, decreased libido, and attention problems.[16-20] Abdominal pain, anemia, and nephropathy as pathologic symptoms of the chronic opium addiction had been confirmed by detection lead within the consumed opium in several studies in the Middle East countries.[21-24]

Sistan area is located in the eastern parts of Iran near the Afghanistan border. This region is one of the main routes of opium transposition from Afghanistan. People in this area are exposed to different kinds of opium and different types of opium consumption can be seen within the community.[12] Recent evidence have shown that the consumed opium can be combined with lead to be increased in weight.[12] Such processing actions will increase the risk of lead poisoning among opium consumers.

There are limited studies reporting the lead poisoning among opium consumers, especially in Sistan area. On the other hand, all of these studies compared all addicts with control groups and did not compare different kinds of opium use. Due to the different routes and outcomes of lead entrance, it is important to investigate these consequences in a highly affected area in Iran. This study aims to compare the blood lead level (BLL) in different opium consumers and non-addict individuals.

Methods

This cross-sectional study was conducted in Sistan area in the eastern part of Iran. Participants were selected from patients admitted in Amir Al-Momenin Hospital, Zabol, Iran, during spring 2015. Cases were opium addicts (those who declared that they had ever used opium and still continue) and controls were patients in that hospital without any history of opium consumption.

Using systematic random sampling from 250 opium addict patients referred to Amir Al-Momenin Hospital during the study period 55 oral and 55 inhaled addicts were selected. We also recruited 78 non-addicts from patients referring to that hospital in the same referral dates of addict patients.

All participants were interviewed regarding demographic characteristics and their health status using a personal data questionnaire. A written informed consent was provided from all subjects. Persons, who worked in jobs related to lead exposure (batteries, soldering, wiring, pottery, radiators, and painting), were excluded from the study. Patients should not be admitted due to opium addiction consequences. They also should not have any malabsorption. The BLL of all the subjects was measured using an atomic absorption spectrophotometer.[25]

Categorical variables were compared between different groups using chi-square test. We used t-test and ANOVA (for normally distributed data).

Moreover, Kruskal–Wallis and Mann-Whitney tests (for non-normally distributed data) to compare continuous variables between the groups. Univariate and multivariate regression models were applied to estimate crude and adjusted (controlling for age, gender, job, and residential area) mean difference of BLL between groups. All statistical analyses were performed using STATA software (Version 11, Stata Corporation, College Station, TX, USA). $P < 0.050$ was considered statistically significant.

Results

In total, 188 participants were recruited in the study with an average ± standard deviation (SD) age of 52.06 ± 12.46 years, 60.64% of them were male. Among them, 55 (29.41%) consumed opium orally and 55 (29.41%) used it in the inhaled form. These groups were compared with 78 control subjects. All participants were Iranian; most of whom were jobless (45.21%) or housewife (39.36%). Almost all of them (99.50%) were undergraduate and consumed “Tariak” (99.09%). Mean ± SD duration of opium addiction was 13.21 ± 10.26 years.

Comparing the characteristics of different opium users showed that oral opium consumers experienced weakness (34.55% vs. 14.55%; P = 0.010) and coma (81.82% vs. 60.00%; P = 0.010) significantly more than inhaled form users. Moreover, oral users had higher platelet count (236000 vs. 199000; P = 0.040). In addition, they had more frequency of jobless and housewife individuals (85.45% vs. 61.83%; P = 0.009). No significant difference was observed between the two groups regarding other demographic, clinical, and biochemical characteristics (Tables 1 and 2).

The average serum lead concentration among oral users, inhaled users, and control group were 34.31 ± 21.54, 41.13 ± 26.40, and 9.86 ± 4.40 µg/dl, respectively (P = 0.001).

Table 1. Clinical and demographic factors of participants according to the form of opium use

Clinical and demographic factors	Inhalation	Oral	P
Age (year) (mean ± SD)	49.54 ± 14.23	54.60 ± 13.50	0.060
Sex [n (%)]			
Female	21 (38.15)	28 (50.91)	0.200
Male	34 (61.82)	27 (49.09)	
Marital [n (%)]			
Married	49 (89.09)	53 (96.36)	0.100
Single	6 (10.91)	2 (3.64)	
Residence [n (%)]			
Urban	44 (80.00)	43 (78.18)	0.800
Rural	11 (20.00)	12 (21.82)	
Job [n (%)]			
Employee	3 (5.45)	5 (9.09)	0.009
Self-employed	10 (18.18)	1 (1.82)	
Farmer	8 (14.55)	2 (3.64)	
Housewife/jobless	34 (61.82)	47 (85.45)	
Education [n (%)]			
Under Diploma	52 (94.55)	54 (98.18)	0.500
Diploma	2 (3.64)	1 (1.82)	
Post graduate	1 (1.82)	0 (0)	
Opium [n (%)]			
Tariak	54 (98.18)	55 (100)	0.300
Kerak	1 (1.82)	0 (0)	
Weakness [n (%)]			
Yes	36 (65.45)	47 (85.45)	0.010
No	19 (34.55)	8 (14.55)	
Swelling [n (%)]			
Yes	12 (21.82)	18 (32.73)	0.200
No	43 (78.18)	37 (67.27)	
Coma [n (%)]			
Yes	10 (18.18)	22 (40.00)	0.010
No	45 (81.82)	33 (60.00)	
Abdominal pain [n (%)]			
Yes	40 (72.73)	44 (80.00)	0.400
No	15 (27.27)	11 (20.00)	
Pallor [n (%)]			
Yes	47 (85.45)	46 (83.64)	0.800
No	8 (14.55)	9 (16.36)	
Vertigo [n (%)]			
Yes	46 (83.64)	48 (87.27)	0.600
No	9 (16.36)	7 (12.73)	
EDTA [n (%)]			
Yes	1 (1.82)	0 (0)	0.300
No	54 (98.18)	55 (100)	

EDTA: Ethylenediaminetetraacetic acid; SD: Standard deviation

Table 2. Biochemical characteristics of participants according to the form of opium use

Biochemical tests	Inhalation use	Oral use	P
	Median (IQ range)	Median (IQ range)	
Hemoglobin	12.7 (12-13.7)	12.7 (12-13.6)	0.800
Platelet	199000 (170000-245000)	236000 (19000-258000)	0.040
WBC	6000 (4500-8100)	6900 (4500-8500)	0.200
Creatinine (mg/dl)	0.9 (0.8-1)	0.9 (0.8-1.1)	0.800
BUN (mg/dl)	14.5 (11.4-15.6)	14.8 (13-18)	0.100
ALT	22 (19-28)	23 (21-29)	0.400
AST	17(15-19)	16 (14-20)	0.600
Uric acid (mg/dl)	3.7 (3-4.4)	3.8 (2.6-4.8)	0.800
BLL (µg/dl)	31.57 (19.15-54.27)	30.15 (17.60-48.05)	0.200

BLL: Blood lead level; WBC: White blood cell; BUN: Blood urea nitrogen; ALT: Alanine aminotransferase; AST: Aspartate aminotransferase

The mean difference of serum lead level between oral opium users and control group was 24.44 mg/dl (P < 0.001). Corresponding figure for inhaled users and control group and also between inhaled and oral users were 31.27 (P < 0.001) and 6.82 (P = 0.200), respectively.

As illustrated in table 3, crude and adjusted mean differences for lead level between oral users and control group were 24.44 (P < 0.001) and 25.99 (P < 0.001), respectively. It indicates that controlling for age, gender, residence area and job, oral consumers had in average 25.99 mg/dl higher lead level in their serum specimens. Corresponding differences for inhaled form and control group were 31.27 (P < 0.001) and 31.42 (P < 0.001), respectively, indicating 31.42 mg/dl higher levels of lead in the serum of inhaled users compared to control group.

Discussion

Our study showed significant differences of BLLs between opium users and control group. We also did not find any difference between oral and inhaled users.

Our participants with different forms of opium consumption had no difference regarding demographic, clinical and biochemical characteristics except for job, platelet count and history of coma and weakness. Results of this study showed that both inhaled and oral forms of opium use can increase the blood levels of lead among users. Although inhalation form users had higher lead level than oral users, this difference was not statistically significant which indicates that different forms of opium consumption had a similar effect on the BLL.

Recently, few studies reported lead poisoning following opium addiction among Iranian consumers.[12,23,26,27] Moreover, some evidence of the presence of lead within the opium have been reported in Southeast of Aghaee-Afshar et al.[15] Similar to our results, Salehi et al.[12] showed that the mean BLL in opium addicts was significantly higher than that among non-addict subjects. These findings are also similar to those observed by Amiri and Amini[25] which reported significant difference of BLL among addicts and non-addicts. However, Beigmohammadi et al. did not find any difference between these two groups.[26] Aghaee-Afshar et al.[15] reported considerable evidence of harmful amounts of lead within opium samples[28] which had been provided illegally in some hidden laboratories.[27] Lead absorption via the respiratory system is the most common route of opium abuse among Iranian adults[28] with a higher bioavailability,[29] and approximately, 40% absorption.[30] In addition, most of the manifestations of lead poisoning are similar to the symptoms of opium abuse such as nausea, vomiting, constipation, anorexia, and neuropsychological symptoms.[28]

Our univariate and multivariate analyses showed no differences between crude and adjusted

Table 3. Crude and adjusted mean differences of serum lead level between groups

Serum lead level	Crude mean difference	95% CI	Adjusted mean difference*	95% CI
Control group	0	-	0	-
Inhalation	31.27	24.76-37.77	31.42	24.43-38.42
Oral	24.44	17.94-30.95	25.99	19.30-32.68

CI: Confidence interval, *Adjusted based on gender, age, area of residence and job

effects of opium use among both groups. This fact indicates that the adjusted factors such as gender and age did not have any confounding effect on the association between opium use and BLL.

One of the limitations of this study is cross-sectional design of the study. It means that we cannot assess the temporal relationship between opium use and serum lead level. Moreover, it is difficult to make an association between lead poisoning and some clinical symptoms such as coma among study participants due to many unknown or unmeasured potential confounders. Unfortunately, we did not measure the amount of daily consumption due to non-reliable answers. Therefore, we did not investigate the association between symptoms and the amount of opium used.

Conclusion

Our study provided evidence that, although opium addiction has a positive effect on BLL, method of opium use cannot affect this association.

Conflict of Interests

The Authors have no conflict of interest.

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مقایسه سطح سرمی سرب در معتادان خوراکی، استنشاقی و گروه شاهد در جنوب شرق ایران

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مقاله پژوهشی

چکیده

مقدمه: اعتیاد به تریاک یکی از انواع شایع اعتیاد در کشورهای خاورمیانه مانند ایران به شمار می‌رود. گزارش‌های اخیر نشان می‌دهد که بسیاری از فروشندگان مواد مخدر اقدام به مخلوط کردن تریاک با سرب می‌کنند تا وزن آن را افزایش دهند که این امر می‌تواند موجب به خطر افتادن سلامتی استفاده کنندگان شود. هدف از انجام مطالعه حاضر، بررسی میزان سرب خون معتادان و مقایسه آن در معتادان تزریقی و استنشاقی و افراد غیر معتاد در یکی از بیمارستان‌های شهرستان زابل بود.

روش‌ها: سطح سرمی سرب خون (Blood lead level یا BLL) ۱۸۸ ایرانی با میانگین سنی ۱۲/۴۶ ± ۵۶/۰۶ سال شامل ۵۵ معتاد تزریقی، ۵۵ معتاد استنشاقی و ۷۸ فرد شاهد به روش جذب اتمی و با کمک دستگاه اسپکتروفتومتر اندازه‌گیری شد. تفاوت شاخص‌های آماری مربوط به سطح سرب در این افراد در حالت خام و تعدیل شده با هم مقایسه گردید.

یافته‌ها: تمامی معتادان (۹۹/۰۹ درصد) از تریاک استفاده می‌کردند و میانگین (انحراف معیار) طول دوره مصرف تریاک در آنان ۱۰/۲۶ ± ۱۳/۲۱ سال بود. میانگین سرب خون معتادان استنشاقی، ۲۶/۴۰ ± ۴۱/۱۳، معتادان خوراکی ۲۱/۵۴ ± ۳۴/۳۱ و گروه شاهد ۴/۴۰ ± ۹/۸۶ میکروگرم بر دسی‌لیتر گزارش گردید که تفاوت معنی‌داری با یکدیگر داشت (P = ۰/۰۰۱).

نتیجه‌گیری: اگرچه غلظت سرب خون معتادان از غلظت خون افراد غیر معتاد بیشتر بود، اما ارتباطی بین نوع مصرف تریاک و سرب خون مشاهده نشد.

واژگان کلیدی: سطح سرب خون، تریاک (مخدر)، معتاد

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