Background: Like any other drug abuse, opium use is known to have detrimental effects on oral health. Oral hygiene neglect in opium users can lead to tooth loss resulting in further functional, esthetic, and dieting problems. Therefore, the aim of this study was to assess the association between tooth loss and opium addiction in a large-scale population.

Materials and Methods: This study was part of an extensive study related to the risk factors of cardiovascular disease and conducted by the center for physiological research during 2012–2015 in Kerman. A total of 5900, 15–75-year-old individuals, were recruited by a single-stage random cluster sampling method. Factors including opium and smoking consumption, factors related to oral health, hygiene, and the number of missing teeth were examined. Data were collected through questionnaires, interviews, and physical examination.

Results: Of 5900 individuals, 2662 (45.1%) were men and the rest were women, which 1011 individuals (17.1%) consumed opium. The prevalence of opium abuse was significantly higher in men. Regarding the oral dental indicators, the numbers of missing teeth ($P < 0.001$), decayed ($P = 0.01$), and the total index of decayed, missing, and filled teeth ($P < 0.001$) were significantly higher in addicts as compared to nonaddicts. The gingival index and community periodontal index scores were significantly lower in addicts. Addicted women had a higher prevalence of tooth loss.

Conclusions: Opium addiction is associated with higher tooth loss, especially, in women opium users. Dental practitioners and health politicians should pay special attention to the oral health of addicts before tooth loss occurs.

Keywords: Opium, oral health, tooth loss

INTRODUCTION

Today, substance abuse has become a serious concern for people across the world.\cite{1} It has detrimental physical and psychological effects to the human body which increases the risk of death from multiple causes.\cite{2-4} Oral health problems are among the wide range of disease that is known to be associated with drug abuse. Xerostomia due to the hypofunction of salivary glands results in a higher rate of dental abrasion, halitosis, taste impairment, and burning mouth syndrome.\cite{5} Over sighting dental health care, low socioeconomic status and limited access to the dental team, and poor diet are factors which exacerbate oral health problems in addicts.\cite{5,6} All above factors result in periodontal damage and severe tooth decay.

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A recent systematic review on 28 studies with valid data revealed greater tooth loss and severe periodontal destruction in substance addicted individuals. According to the data of this study, addicted patients were less likely to have received dental treatment.\(^{[7]}\)

Drug addiction is very common in Iran and over the past 30 years has grown more than three times the population growth rate.\(^{[8,9]}\) Opioids are the most commonly used drugs among Iranian addicts.\(^{[9]}\) The belief that opium consumption has preventative effects on diseases such as cardiovascular disease and hypertension is common among lay Iranian people contributing to the high prevalence of opium use in this population.\(^{[10]}\) Furthermore, unlike alcohol consumption, opium use is not forbidden even in religious people. Therefore, self-reported opium use is considered to be a reliable method.\(^{[3]}\)

Very few studies have investigated the association between opium addiction and tooth loss.

In Iran, most studies assessing the relationship between drug dependency and dental status have been carried out on a limited number of individuals, mostly executed in drug abuse rehabilitation centers which do not represent the general population. Furthermore, these studies included a limited number of female individuals.

Therefore, the aim of the study was to assess the association between opium abuse and tooth loss in a large representative population in Kerman, South East of Iran, and to determine the determinants of this association.

### Materials and Methods

The data of this cross-sectional study are obtained from the results of the first round of coronary artery disease risk factors (The KERCADR) cohort study; a study which was carried out on 5900 individuals, aged 15–75, in Kerman, the largest province in South East of Iran, in 2012–2015 more detailed information is stated in the first report of this study.\(^{[11]}\) Nonproportion to size one-stage cluster random sampling was used to recruit eligible individuals. Two hundred and fifty postal codes were randomly selected from an updated roster of residential address. These codes were mapped, and social mobilizers referred to each addressed house. Eligible individuals were specified and invited to participate in the study. An appointment card was given to each eligible individual. Individuals with bleeding disorders, epilepsy, immune system deficiency, any type of cancer, chronic inflammatory disease, and bulimia were not included in the study. Furthermore, data related to pregnant women and individuals who used hash and heroin were excluded for data analysis. The final analysis was carried out on 5900, 15–75-year-old individuals.

Demographic information such as age, gender, occupation, educational status, familial status, location, and period of residency in Kerman was recorded.

Data related to opium use status were also obtained through a face-to-face interview with a trained general practitioner. Individuals were asked whether they ever used any type of drug and if they are still continuing. A pilot study carried out on a similar population in Iran stated self-reported opium use as a valid and reliable method for measuring opium use.\(^{[12]}\) In the case of a positive answer, the type of drug was recorded. According to diagnostic and statistical manual of mental disorders (DMS-IV2), individuals who took opium derivatives (orally or in an inhaling form), at least three times a week, were considered addicted to opium.\(^{[13]}\)

In this study, if a person noted smoking as his/her habit in the first interview of this survey, he/she was considered as a smoker.

A calibrated dentist carried out the dental examinations using a periodontal probe, plane mirror, and a head light. Decayed, missing, and filled teeth (DMFT) index was recorded according to the WHO criteria. Dental plaque and calculus were also recorded using plaque index and community periodontal index (CPI), respectively.

The study gained ethical approval from the Ethics Committee of Kerman University of Medical Science with ethic code number: 88/110 KA.

Data were analyzed using SPSS version 20 (Chicago, USA). Independent t-test, McNemar’s test, Chi–square, and Fisher’s exact test were used for statistical analysis. Adjusted multivariate regression analysis was performed to consider confounding factors. The significance level was set at \(P < 0.05\).

### Results

Overall 5900 individuals participated in this study, in which 2662 (45.1%) were male and 3238 (54.9%) were female. Results showed that 17.6% were dependent on some type of drug (currently or in the past), of which 95% noted dependency to opium. Regarding opium use, 1011 (17.1%) individuals mentioned that they frequently used opium; all of which also smoked cigarette. Among these, 831 individuals were currently smoking, and 180 reported a history of smoking.

Demographic characteristics and opium use status are presented in Table 1.

In general, the mean years of opium use were 11.65 ± 9.42 years. Furthermore, 820 men and 191 women stated an addiction to opium. This difference was statistically significant \((P = 0.001)\).
Mean age of addicted individuals was 56.01 ± 13.49 years, and nonaddicted individuals had a mean age of 48.19 ± 16.55 years. This difference was statistically significant (P = 0.00).

Table 2 presents the frequency of opium use in male and female individuals.

Among addicts to opium, women gained a higher mean missed teeth (P = 0.04) and DMFT index (P = 0.03) when compared to men. Other oral health indices were similar in both groups.

Table 3 presents dental health indices in addicted individuals according to gender.

Results showed that missed teeth (P < 0.001), decayed teeth (P = 0.01), and DMFT score (P = 0.001) in addicted individuals were significantly higher than nonaddicted individuals, whereas filled teeth did not differ significantly between two groups. Likewise, gingival index (GI) and CPI were significantly lower in people who were addicted to opium.

Table 4 shows dental indices in opium addicted and nonaddicted individuals.

When adjusted for age, gender, CPI, and GI, results of logistic regression analysis revealed a significant difference between missed teeth and decayed teeth in opium addicted individuals compared to nonaddicted individuals (P = 0.001).

**DISCUSSION**

Results of this study showed that individuals who were addicted to opium had more extracted and decayed teeth than nonaddicted individuals. Saied-Moallemi et al., Akbari et al., and Ghane et al. also obtained similar results in Iran.[14-16] Rooban et al. also stated that tobacco use in any form increased the risk of dental caries.[17] The DMFT score was also higher in these individuals. This could be related to a wide range of causes. Marques et al. stated that the higher DMFT in substance abusers is due to their poor quality of life.[6] Furthermore, Mysels and Sullivan realized that frequent use of opium is associated with higher sugar consumption, justifying the higher number of dental caries in this group.[18] Likewise, Rooban et al. noted poor oral hygiene as the cause of higher DMFT in opium abusers.[19]

Similar to the finding of other studies in Iran regarding drug abuse, addiction to opium was much more prevalent in men compared to women (96.8% men and 3.2% women).[20] Another large scale study carried out on 4400 addicts who referred to a drug abuse rehabilitation center in Khuzestan province in Iran revealed that 97.5% of addicts were men and 2.5% were women.[6] Cultural reasons and the fact that addicted women in Iran are less socially accepted than men could be the reason for this great difference. Many Iranian women are ashamed to confess that they are addicted to any drug referring less to rehabilitation centers for quitting.

Although opium abuse was much more prevalent in men, dental caries due to addiction seem to affect women

### Table 1: Demographic characteristics and drug use status

| Variable                  | Frequency (%) |
|---------------------------|---------------|
| Gender                    |               |
| Male                      | 2662 (45.1)   |
| Female                    | 3238 (54.9)   |
| Occupation                |               |
| Housekeeper               | 2388 (40.5)   |
| Self-employed             | 1359 (23)     |
| Retired                   | 840 (14.2)    |
| Student                   | 483 (8.2)     |
| Other                     | 830 (14.1)    |
| Education status          |               |
| Under diploma             | 2858 (48.6)   |
| Diploma                   | 1928 (32.7)   |
| Associate degree          | 427 (7.2)     |
| Bachelor’s degree         | 683 (11.6)    |
| Narcotic drug use         |               |
| Never used                | 4863 (82.4)   |
| Currently using           | 850 (14.4)    |
| Quitted using             | 187 (3.2)     |
| Opium use                 |               |
| Yes                       | 1011 (17.1)   |
| No                        | 488 (82.9)    |
| Smoking status            |               |
| Yes                       | 1011 (17.1)   |
| No                        | 4889 (82.9)   |
| Other opium derivatives   |               |
| Yes                       | 376 (6.4)     |
| No                        | 5524 (93.6)   |
| Dependence on drugs       |               |
| Complete dependence       | 478 (8.1)     |
| Occasional use            | 181 (3.1)     |
| Quitted using             | 372 (6.3)     |
| Never used                | 4869 (82.5)   |
| Daily opium use           |               |
| Less than once a day      | 340 (5.8)     |
| Twice a day               | 289 (4.9)     |
| More than three times a day| 289 (4.9)   |
| Never                     | 93 (1.4)      |

### Table 2: Opium use status according to gender

| Gender | Addicted to opium (%) | Nonaddicted to opium (%) | P       |
|--------|-----------------------|--------------------------|---------|
| Male   | 820 (13.9)            | 1842 (31.2)              | 0.001 (Chi-square) |
| Female | 191 (18.9)            | 3047 (51.6)              |         |
| Total  | 1011 (17.1)           | 4889 (82.9)              |         |
more. Compared to addicted men, addicted women had a higher DMFT score and missed teeth. On the other hand, the CPI index was higher in men, but we cannot deduce that periodontal problems are more prevalent in addicted men than women because women had more extracted teeth and the reason for extraction was unknown (it could be due to severe periodontal problems leading to tooth loss). A recent study revealed the fact that physical and psychiatric comorbidities such as chronic pain, anxiety, and depression were more prevalent in opium-dependent woman compared to men.[23] These mental and physical disorders may explain why addicted women refer less to dentists and remain untreated with more dental problems. Furthermore, depression may lead to oral hygiene neglect. Overall women seem to be more vulnerable to the harmful effects of drugs.[21]

Although GI was significantly lower in people who were addicted to opium, mean GI score for both addicted and nonaddicted individuals was in the range of 1–2 representing a mild gingival inflammation, slight color change, and no bleeding on probing for addicted and nonaddicted individuals. Since this difference was significant, we can deduce that nonaddicts were more likely to have gingival inflammation and gingival color change.

Regarding CPI, addicted individuals had a score of 1.27 ± 1.03, whereas nonaddicted individuals had a CPI score of 1.65 ± 0.83. The mean CPI score in both groups is in a range which shows that bleeding on probing and calculus exists with no periodontal pocket. Nevertheless, this difference was statistically significant \((P = 0.00)\), which means that addicted individuals tend to have less bleeding on probing compared to nonaddicts. Masoumi et al. have also reported that gingival bleeding and periodontal diseases had lower scores in nonaddict people compared to a matched group of drug users.[22] Furthermore, Thavarajah et al. detected caries in all only drug abusers, whereas no gingivitis or periodontitis was detected in this group.[23]

In our study, all opium-addicted individuals were also smokers. Other studies in Iran also achieved the same results.[14,15] Smoking could be a risk factor for future addiction to drugs.

There are limitations to this study. Although some studies have considered self-report of opium use as a reliable and valid method for obtaining information on addiction status, there are of course individuals who have not totally been honest about their opium use. Furthermore, mean age of individuals was high (addicts and nonaddicts) and aging is an influencing factor in tooth loss. Maybe if a younger sample of individuals were recruited, the results would be more reliable.

**Conclusions**

The higher prevalence of tooth loss among addicts to opium shows the fact that opium dependence has irrevocable and everlasting effects on oral health. These effects cannot be retrieved even after opium use cessation. Therefore, it is essential for dental practitioners to consider the diagnosis of opium addiction in their routine dental examination, inform patients about harmful effects to their teeth, and refer patients for further assessment and consultation.

Special attention should be paid to the oral health of addicted women which seem to be more affected by oral health consequences of opium dependence.

Furthermore, it is essential that a dentist be a part of the team for the treatment of drug abuse to educate addicts about the importance of oral hygiene and make sure regular dental visiting takes place.

Table 3: Comparison of dental indices between male and female addicts to opium

| Variable                        | Male (mean±SD) | Female (mean±SD) | No. | No. | \(t\)-test |
|---------------------------------|----------------|------------------|-----|-----|------------|
| Missed teeth                    | 8.82±6.69      | 10.31±6.38      | 466 | 94  | 0.04*      |
| Decayed teeth                   | 9.45±5.08      | 9.80±5.13       | 514 | 99  | 0.52       |
| Filled teeth                    | 4.77±7.36      | 27.00±1.90      | 13  | 1   | 0.01*      |
| DMFT                            | 16.84±6.84     | 18.39±7.06      | 531 | 104 | 0.03*      |
| Community periodontal index     | 2.07±0.30      | 2.05±0.26       | 516 | 98  | 0.49       |
| Gingival index                  | 1.84±0.41      | 1.76±0.42       | 520 | 102 | 0.06       |

*Significant. DMFT=Decayed, missing, and filled teeth, SD=Standard deviation

Table 4: Comparison of dental indices between opium-addicted and nonaddicted individuals

| Variable                        | Addicted to opium (mean±SD) | n  | Nonaddicted to opium (mean±SD) | n  | \(t\)-test |
|---------------------------------|-----------------------------|----|--------------------------------|----|------------|
| Missed teeth                    | 9.07±6.66                   | 560| 6.42±5.60                      | 2771| <0.001*    |
| Decayed teeth                   | 9.50±5.09                   | 613| 8.95±4.00                      | 3921| 0.01*      |
| Filled teeth                    | 6.36±9.23                   | 14 | 3.89±3.18                      | 175 | 0.33       |
| DMFT                            | 17.10±6.90                  | 635| 13.35±5.63                     | 4005| <0.001*    |
| Community periodontal index     | 1.27±1.03                   | 1000| 1.65±0.83                     | 4866| <0.001*    |
| Gingival index                  | 1.12±0.95                   | 1011| 1.32±0.77                     | 4889| <0.001*    |

*Significant. DMFT=Decayed, missing, and filled teeth, SD=Standard deviation
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CONFLICTS OF INTEREST
There are no conflicts of interest.

REFERENCES

1. Shekarchizadeh H, Khami MR, Mohebbi SZ, Ekhtiari H, Virtanen JI. Oral health of drug abusers: A review of health effects and care. Iran J Public Health 2013;42:929-40.

2. Malhotra R, Kapoor A, Grover V, Kaushal S. Nicotine and periodontal tissues. J Indian Soc Periodontol 2010;14:72-9.

3. Khademi H, Malekzadeh R, Pourshams A, Jafari E, Salahi R, Semnani S, et al. Opium use and mortality in Golestan Cohort Study: Prospective cohort study of 50,000 adults in Iran. BMJ 2012;344:e2502.

4. Aliramaji A, Kaseean A, Yousefnia Pasha YR, Shafi H, Kamali S, Safari M, et al. Age distribution types of bladder cancers and their relationship with opium consumption and smoking. Caspian J Intern Med 2015;6:82-6.

5. Saini GK, Gupta ND, Prabhat KC. Drug addiction and periodontal diseases. J Indian Soc Periodontol 2013;17:587-91.

6. Marques TC, Sarracini KL, Cortellazzi KL, Mialhe FL, de Castro Meneghim M, Pereira AC, et al. The impact of oral health conditions, socioeconomic status and use of specific substances on quality of life of addicted persons. BMC Oral Health 2015;15:38.

7. Bughaei H, Kisey S, Forbes M, Sawyer E, Siskind DJ. A systematic review and meta-analysis of the association between poor oral health and substance abuse. Addiction 2017;112:765-79.

8. Rahimi Movaghar A, Mohammad K, Razzaghi E. Trend of drug abuse situation in Iran: A three-decade survey. Hakim Res J 2002;5:171-81.

9. Jamshidi F, Nazari I, Malayeri HT, Rahimi Z, Cheraghi M. Pattern of drug abuse in addicts self-referred drug rehabilitation centers in Khuzestan province-Iran, 2014-2015. Arch Med Sadowej Kryminol 2016;66:1-12.

10. Najafi-pour H, Masoomi M, Shahesmaeili A, Haghdoost AA, Afshari M, Nasri HR, et al. Effects of opium consumption on coronary artery disease risk factors and oral health: Results of Kerman coronary artery disease risk factors study a population-based survey on 5900 subjects aged 15-75 years. Int J Prev Med 2015;6:42.

11. Najafi-pour H, Mirzazadeh A, Haghdoost A, Shadkam M, Afshari M, Moazenzadeh M, et al. Coronary artery disease risk factors in an Urban and Peri-urban setting, Kerman, Southeastern Iran (KERCADR study): Methodology and preliminary report. Iran J Public Health 2012;41:86-92.

12. Abnet CC, Saadatian-Elahi M, Pourshams A, Boffetta P, Feizazadeh A, Brennan P, et al. Reliability and validity of opiate use self-report in a population at high risk for esophageal cancer in Golestan, Iran. Cancer Epidemiol Biomarkers Prev 2004;13:1068-70.

13. American Psychiatric Association, Committee on Nomenclature and Statistics. DSM-IV: Diagnostic and Statistical Manual of Mental Disorders, Washington DC: American Psychiatric Association; 1975.

14. Saied-Moallemi Z, Taheri A, Hatami H. Investigating the relation of drug abusing and oral health in addicts. J Isfahan Med Sch 2015;33:643-52.

15. Akbari M, Faghan M, Kazemian A, Afshari R, Taghian A, Talebi A. Evaluation of oral health status and dental need assessment in narcotic drug users. J Mash Dent Sch 2015;39:191-200.

16. Ghanie M, Pourhashemi S, Jafari A, Shekarchizadeh H. Oral health behavior of in-treatment female drug addicts in Tehran. J Dent Med Tehran Univ Med Sci 2016;29:60-9.

17. Rooban T, Vidya K, Joshua E, Rao A, Ranganathan S, Rao UK, et al. Tooth decay in alcohol and tobacco abusers. J Oral Maxillofac Pathol 2011;15:14-21.

18. Mysels DJ, Sullivan MA. The relationship between opioid and sugar intake: Review of evidence and clinical applications. J Opioid Manag 2010;6:445-52.

19. Rooban T, Rao A, Joshua E, Ranganathan K. Dental and oral health status in drug abusers in Chennai, India: A cross-sectional study. J Oral Maxillofac Pathol 2008;12:16.

20. Ahmadi J, Hasami M. Prevalence of substance use among Iranian high school students. Addict Behav 2003;28:375-9.

21. Naji L, Dennis BB, Bawor M, Varenbut M, Daiter J, Plater C, et al. The association between age of onset of opioid use and comorbidity among opioid dependent patients receiving methadone maintenance therapy. Addict Sci Clin Pract 2017;12:9.

22. Masoumi M, Malek Mohammadi T, Rashidi M, Mir-rashidi FS. The association between consumption of opium and gum inflammation in 15-75 years old people in Kerman in 2010. J Neyshabur Univ Med Sci 2015;2:29-34.

23. Thavarajah R, Rao A, Raman U, Rajasekaran ST, Joshua E, Hemalatha R, et al. Oral lesions of 500 habitual psychoactive substance users in Chennai, India. Arch Oral Biol 2006;51:512-9.