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RESEARCH ARTICLE OPEN ACCESS

Determining the Negative Factors Affecting the Quality of Life Related to Oral Health in People with a History of Drug Abuse

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Abstract:

Introduction: Drug abuse is strongly linked to poor oral health, which significantly impairs Oral Health-Related Quality of Life (OHRQoL). Individuals with substance use disorders often experience pain, functional limitations, and psychosocial distress due to neglected oral care and the biological effects of drugs. This study aimed to identify sociodemographic, behavioral, and drug-related factors associated with impaired OHRQoL among people with a history of drug abuse in Birjand, Iran.

Methods: A cross-sectional study was conducted with 114 clients from an addiction treatment center. Data were collected through face-to-face interviews and the validated Persian version of the OHIP-14 questionnaire. Impaired OHRQoL was defined as a total score above the sample median. Bivariate and multivariate Poisson regression analyses were performed to identify predictors, with results reported as Prevalence Ratios (PR) and 95% Confidence Intervals (CI).

Results: The median OHIP-14 score was 27, with 52.6% of participants classified as having impaired OHRQoL. Multivariate analysis revealed that four factors were independently associated with poorer OHRQoL such as age >45 years (adjusted PR =1.42; 95% CI: 1.08–1.87), illiteracy (adjusted PR = 1.38; 95% CI: 1.05–1.82), lack of dental floss use (adjusted PR = 1.71; 95% CI: 1.12–2.61), and early initiation of drug use (<25 years) (adjusted PR = 1.65; 95% CI: 1.10–2.48) (all $p < 0.05$). Oral hygiene was alarmingly poor, as 55.3% of the participants did not use a toothbrush, and 96.5% never used dental floss.

Discussion: The findings indicate a substantial burden of oral health problems among individuals with a history of drug abuse, driven largely by preventable behavioral and sociodemographic factors. The strong associations with poor hygiene practices and early drug initiation highlight the need for integrating basic oral health education and preventive dental services into addiction treatment programs. Key limitations include the cross-sectional design, which limits causal inference, and the reliance on self-reported data. Future longitudinal studies are recommended to validate these results.

Conclusion: Impaired OHRQoL in this population is driven by modifiable behavioral and socio-demographic factors. Integrating oral health education, particularly interdental cleaning, and preventive dental services into addiction treatment programs could substantially improve the quality of life for this vulnerable group.

Keywords: Oral health-related quality of life, OHIP-14, Oral hygiene, Dental floss, Methadone treatment, Socio-demographic factors.

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1. INTRODUCTION

The impact of substance abuse on overall health is profound, encompassing both physical and psychological dimensions. Among the myriad of health issues faced by individuals with a history of drug abuse, oral and dental health problems are particularly prevalent [1]. Research indicates that drug abuse contributes to a range of oral health complications, including periodontal disease, dental caries, and oral mucosal lesions. These conditions, in turn, can significantly reduce the quality of life of affected individuals, manifesting as pain, discomfort, and functional limitations [2, 3].

The relationship between oral health and quality of life has garnered increasing attention in recent years. Quality of life, particularly in the context of health, is a broad concept that encompasses physical health, psychological well-being, social relationships, and overall life satisfaction. In individuals with a history of drug abuse, the deterioration of oral health not only affects personal comfort and aesthetics but can also lead to social stigma, isolation, and adverse economic consequences. Hence, understanding the interplay of drug abuse, oral health, and quality of life is crucial for developing comprehensive treatment and intervention strategies [4-7].

Several studies have highlighted the factors contributing to poor oral health in drug abusers, including socio-economic status, educational background, and access to dental care. Furthermore, lifestyle choices such as inadequate oral hygiene practices, dietary habits, and the psychosocial consequences of addiction exacerbate these issues. However, a gap remains in the literature regarding the specific examination of how these factors collectively influence the quality of life related to oral health in this vulnerable population [3, 8-11].

Additionally, limited research has specifically examined how socio-demographic characteristics, drug use patterns, and oral hygiene behaviors collectively and independently influence OHRQoL in this vulnerable population, particularly in settings where opium is the predominant substance of abuse.

2. MATERIALS AND METHODS

This cross-sectional, descriptive-analytical study was conducted between March and October 2024 at the Addiction Treatment Center of Imam Reza Hospital in Birjand, Iran. The study was approved by the Ethics Committee of Birjand University of Medical Sciences (Code: IR.BUMS.REC.1402.105) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrollment.

2.1. Study Population and Sampling

The target population consisted of individuals with a history of drug use who attended the center for examination or methadone treatment. Inclusion criteria were: (1) adults (≥18 years) with a history of substance use, and (2) willingness to participate. Exclusion criteria included severe mental illness, underlying systemic diseases affecting quality of life, and incomplete questionnaires. Based on a previous study [12], the required sample size was calculated to be 106. To account for potential non-responses, the sample was increased to 114. Participants were selected through convenience sampling, which allowed targeted recruitment but may limit generalizability, a limitation acknowledged in the discussion.

2.2. Definitions of Drug Categories

For this study:

Traditional drugs referred to naturally derived substances, primarily opium, which was the most commonly reported drug in the sample.

Industrial drugs refer to synthetic substances such as methamphetamine or other laboratory-produced narcotics.

Participants using multiple substances were not excluded; however, the first and primary drug used was recorded for analysis.

2.3. Data Collection and Instruments

Data were collected through structured face-to-face interviews by trained researchers. Information on demographics (age, gender, marital status, occupation, and income) and drug use (type, mode of use, age of initiation, daily consumption, and duration of methadone treatment) was obtained.

The Oral Health Impact Profile-14 (OHIP-14) questionnaire was used to assess Oral Health-Related Quality of Life (OHRQoL). This tool was chosen for its wide validation in diverse populations, including those with chronic health conditions [10]. It measures seven key dimensions of OHRQoL (functional limitation, physical

pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap).

Compared to other tools such as the Geriatric Oral Health Assessment Index (GOHAI), OHIP-14 captures a broader spectrum of psychosocial and functional impacts relevant to drug users [11].

The validated Persian version of OHIP-14 was administered, with responses scored on a 5-point Likert scale ranging from "never" (1) to "always" (5). The OHIP-14 total score ranges from 14 to 70, with higher scores indicating worse OHRQoL. For analytical purposes, scores were dichotomized at the sample median (27); participants scoring above the median were classified as having "impaired OHRQoL [12].

2.4. Conceptual Framework

The study was guided by a conceptual framework positing that substance abuse influences oral health through both biological (*e.g.*, xerostomia, poor dentition, increased risk of oral lesions) and behavioral pathways (*e.g.*, neglect of oral hygiene, unhealthy diet), which in turn impact OHRQoL outcomes. Socio-demographic factors (age, gender, education, and occupation) act as distal determinants, while drug use patterns and oral hygiene practices serve as proximal factors. This framework informed the selection of variables and the development of regression models.

2.5. Data Analysis

Data were analyzed using SPSS version 24. Descriptive statistics, frequencies, percentages, means, and standard deviations were calculated. For inferential analysis, bivariate Poisson regression was used to assess associations between each independent variable and negative OHRQoL (defined as OHIP-14 score above the median). Variables with a p-value < 0.2 in bivariate analysis were entered into a multivariate Poisson regression model to control for potential confounders, following standard epidemiological practice. Results are reported as Prevalence Ratios (PR) with 95% Confidence Intervals (CI), which are appropriate for cross-sectional studies with common outcomes. Statistical significance was set at $p < 0.05$.

3. RESULTS

3.1. Study Population

A total of 114 participants completed the study. The majority were male (79.8%), married (89.5%), and unemployed (61.4%). The mean age was 49.5 ± 11.4 years (range: 29–83). Regarding education, 27.2% had only primary schooling, and 8.8% were illiterate. Full demographic characteristics are presented in Table **1**.

Participant characteristics regarding drug use patterns and oral hygiene behaviors are presented in Table **2**. All participants reported opium as their primary substance, with no industrial drug users identified. Oral ingestion (73.3%) and smoking (49.5%) were the most common routes of administration. Oral hygiene practices were poor among the participants, with 55.3% not using a toothbrush, and 96.5% never using dental floss. Additionally, 32.5% of participants wore dentures.

Table 1. Descriptive statistics of continuous variables in the study population.

Variable	Minimum	Maximum	Mean	Standard Deviation (SD)
Age (years)	29.0	83.0	49.5	11.5
Age at Start of Drug Use (years)	1.0	68.0	28.7	12.3
Daily Drug Consumption (grams)	0.07	9.20	3.23	2.08
Duration of Methadone Treatment (years)	0.16	20.0	4.88	4.27

Table 2. Drug use patterns and oral hygiene behaviors among participants (n = 114).

Variable	Category	n (%) or Mean ± SD
Primary Drug Type	Opium (traditional)	114 (100.0%)
	Industrial drugs (*e.g.*, methamphetamine)	0 (0.0%)
Route of Administration	Oral ingestion	84 (73.3%)
	Smoking	56 (49.5%)
Age at Initiation of Drug Use	—	28.6 ± 12.3 years
Daily Drug Consumption	—	3.22 ± 2.07 grams
Duration of Methadone Treatment	—	4.88 ± 4.27 years
Oral Hygiene Practices	Toothbrush use	51 (44.7%)
	No toothbrush use	63 (55.3%)
	Dental floss use	4 (3.5%)
	No dental floss use	110 (96.5%)
Denture Use	Yes	37 (32.5%)
	No	77 (67.5%)

A detailed breakdown of participant responses to individual OHIP-14 items is provided in Table 3. Notably, a substantial proportion of participants reported frequent or constant impacts: 19.3% "often" and 4.4% "always" had difficulty eating certain foods (Item 4), 16.7% "often" and 7.9% "always" felt self-conscious about their oral condition (Item 5), and 14.0% "often" and 1.8% "always" felt that life was less satisfying due to oral problems (Item 13). These item-level responses reinforce the high burden of functional and psychosocial impairment in this population.

3.2. Oral Health-related Quality of Life (OHRQoL)

The median OHIP-14 total score was 27 (IQR: 19–36). Participants scoring above the median (n = 60, 52.6%) were classified as having impaired OHRQoL. The domains with the highest mean scores, indicating the most significant impact, were psychological discomfort (4.33 ± 2.23) and pain (4.26 ± 2.20), reflecting substantial mental and physical burden (Table 4).

3.3. Factors Associated with Impaired OHRQoL

Bivariate Poisson regression identified several variables significantly associated with impaired OHRQoL ($p < 0.05$), including age >45 years, female gender, marital status, self-employment, illiteracy, lack of toothbrush and floss use, early drug initiation, and daily drug consumption (Table 5).

However, after adjusting for potential confounders, including age, gender, marital status, education, occupation, denture use, oral hygiene behaviors, and drug use characteristics, multivariate Poisson regression analysis identified only four variables as independently associated with impaired OHRQoL. These were age over 45 years (adjusted prevalence ratio [PR] = 1.42; 95% CI: 1.08–1.87; $p = 0.012$), illiteracy (adjusted PR = 1.38; 95% CI: 1.05–1.82; $p = 0.021$), lack of dental floss use (adjusted PR = 1.71; 95% CI: 1.12–2.61; $p = 0.013$), and early initiation of drug use before the age of 25 years (adjusted PR = 1.65; 95% CI: 1.10–2.48; $p = 0.015$). These four factors represent the most robust predictors of poor OHRQoL in this population.

Table 3. Frequency distribution of responses to OHIP-14 items among participants (n = 114).

Domain	OHIP-14 Item	Never n(%)	Rarely n(%)	Sometimes n(%)	Often n(%)	Always n(%)
Functional Limitation	1. Have you had trouble pronouncing words because of problems with your teeth, mouth, or dentures?	77 (67.5)	13 (11.4)	13 (11.4)	9 (7.9)	2 (1.8)
	2. Have you felt that your sense of taste has worsened because of problems with your teeth, mouth, or dentures?	63 (55.3)	17 (14.9)	17 (14.9)	13 (11.4)	4 (3.5)
Pain	3. Have you had painful aching in your mouth?	59 (51.8)	15 (13.2)	20 (17.5)	17 (14.9)	3 (2.6)
	4. Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth, or dentures?	53 (46.5)	14 (12.3)	20 (17.5)	22 (19.3)	5 (4.4)
Psychological Discomfort	5. Have you been self-conscious because of your teeth, mouth, or dentures?	53 (46.5)	20 (17.5)	13 (11.4)	19 (16.7)	9 (7.9)
	6. Have you felt tense because of problems with your teeth, mouth, or dentures?	53 (46.5)	21 (18.4)	18 (15.8)	18 (15.8)	4 (3.5)
Physical Disability	7. Has your diet been unsatisfactory because of problems with your teeth, mouth, or dentures?	56 (49.1)	14 (12.3)	19 (16.7)	19 (16.7)	6 (5.3)
	8. Have you had to interrupt meals because of problems with your teeth, mouth, or dentures?	63 (55.3)	15 (13.2)	19 (16.7)	15 (13.2)	2 (1.8)
Psychological Disability	9. Have you found it difficult to relax because of problems with your teeth, mouth, or dentures?	54 (47.4)	17 (14.9)	26 (22.8)	14 (12.3)	3 (2.6)
	10. Have you been a bit embarrassed because of problems with your teeth, mouth, or dentures?	62 (54.4)	19 (16.7)	11 (9.6)	15 (13.2)	7 (6.1)
Social Disability	11. Have you been a bit irritable with other people because of problems with your teeth, mouth, or dentures?	58 (50.9)	16 (14.0)	20 (17.6)	17 (14.9)	3 (2.6)
	12. Have you had difficulty doing your usual jobs because of problems with your teeth, mouth, or dentures?	78 (68.4)	15 (13.2)	13 (11.4)	8 (7.0)	0 (0)
Handicap (Performance Disability)	13. Have you felt that life in general was less satisfying because of problems with your teeth, mouth, or dentures?	53 (46.5)	23 (20.2)	20 (17.5)	16 (14.0)	2 (1.8)
	14. Have you been totally unable to function because of problems with your teeth, mouth, or dentures?	85 (74.5)	14 (12.3)	14 (12.3)	1 (0.9)	0 (0)

Table 4. Mean scores for the OHIP-14 dimensions.

Variables	Mean	SD
Functional limitation	3.5789	1.91822
pain	4.2632	2.19836
psychological distress	4.3333	2.23277
physical disability	4.0965	2.20205
Mental disability	4.1316	2.27146
Social disability	3.6140	1.85543
performance disability	3.4298	1.66680
OHIP	27.4474	11.77750

Table 5. Bivariate and multivariate poisson regression analysis of factors associated with impaired OHRQoL.

Variable	Category	Negative OHRQoL n(%)	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	Multivariate *p*-value
Age	≤45 years	27 (60.0)	1.00 (ref)	1.00 (ref)	—
	>45 years	**33 (47.8)**	**1.59 (1.12–1.97)**	**1.42 (1.08–1.87)**	**0.012**
Sex	Male	44 (48.4)	1.00 (ref)	1.00 (ref)	—
	Female	16 (69.6)	1.49 (1.07–1.82)	1.21 (0.92–1.59)	0.162
Marital Status	Single	7 (58.3)	1.00 (ref)	1.00 (ref)	—
	Married	53 (52.0)	1.49 (1.07–1.82)	1.18 (0.85–1.64)	0.321
Occupation	Unemployed	1 (50.0)	1.00 (ref)	—	—
	Self-employed	37 (52.9)	1.24 (1.02–1.54)	1.10 (0.88–1.37)	0.401
Education	Literate (any)	50 (51.0)	1.00 (ref)	1.00 (ref)	—
	Illiterate	**10 (58.8)**	**1.49 (1.07–1.82)**	**1.38 (1.05–1.82)**	**0.021**
Dental Floss Use	Yes	2 (50.0)	1.00 (ref)	1.00 (ref)	—
	No	**58 (52.7)**	**1.86 (1.17–2.82)**	**1.71 (1.12–2.61)**	**0.013**
Age at Drug Initiation	≥25 years	30 (45.5)	1.00 (ref)	1.00 (ref)	—
	<25 years	**30 (65.2)**	**1.96 (1.07–2.82)**	**1.65 (1.10–2.48)**	**0.015**
Toothbrush Use	Yes	51 (50.5)	1.00 (ref)	1.00 (ref)	—
	No	9 (52.9)	1.14 (0.84–1.75)	1.09 (0.81–1.47)	0.572
Daily Drug Consumption	Continuous (per gram)	—	1.19 (0.77–1.82)	1.08 (0.89–1.31)	0.432
Denture Use	No	49 (63.6)	1.00 (ref)	1.00 (ref)	—
	Yes	11 (29.7)	1.21 (1.01–1.49)	1.15 (0.94–1.41)	0.178

Note: Only variables with $p < 0.2$ in bivariate analysis were entered into the multivariate model.
PR = Prevalence Ratio; CI = Confidence Interval.
Bolded rows indicate variables that remained statistically significant ($p < 0.05$) in the multivariate model and are the only independent predictors of impaired OHRQoL.
The multivariate model was adjusted for: age, gender, marital status, education, occupation, denture use, toothbrush/floss use, age at drug initiation, and daily drug consumption.

4. DISCUSSION

The findings of this study highlight that older age (>45 years), illiteracy, lack of dental floss use, and early initiation of drug use are the key independent factors associated with impaired OHRQoL among individuals with a history of substance abuse. These results underscore the interplay between socio-demographic vulnerability, behavioral neglect, and the timing of addiction onset in shaping oral health outcomes [4, 13].

Poor oral hygiene practices were alarmingly prevalent, as 55.3% did not use a toothbrush, and 96.5% never used dental floss. Although toothbrush use lost significance in the final model, dental floss use emerged as a robust predictor, suggesting that even minimal interdental cleaning may confer meaningful protection against oral health decline in this population. This finding supports the integration of simple, low-cost hygiene education, particularly flossing, into addiction treatment protocols [8, 16].

The association between early drug initiation (<25 years) and worse OHRQoL aligns with evidence that prolonged substance exposure leads to cumulative oral damage, including xerostomia, caries, and periodontal disease. Similarly, older age may reflect both longer duration of drug use and age-related physiological decline, compounding oral health risks. Illiteracy, as a proxy for low health literacy and limited access to preventive information, further exacerbates vulnerability, consistent with global evidence that links education to oral health outcomes [17, 18].

Interestingly, participants with dentures reported poorer OHRQoL than those without. This likely reflects the

severity of prior tooth loss rather than an adverse effect of prostheses per se [19]. In resource-limited settings, dentures may be poorly fitted, inadequately maintained, or provided without follow-up care, factors that can compromise, rather than restore, function and comfort. This underscores the need for comprehensive prosthodontic care, not just appliance provision [20].

All participants in this study used traditional drugs, primarily opium, which limits generalizability to users of synthetic substances (*e.g.*, methamphetamine). However, the identified pathways, such as neglect of hygiene, socioeconomic marginalization, and delayed care, are consistent across substance types, suggesting broader relevance. International studies report similar OHRQoL burdens among heroin and stimulant users, reinforcing the universality of these social-behavioral determinants [18, 21].

From a policy perspective, these findings support the implementation of routine oral health screenings and preventive services within addiction treatment centers. Given that methadone programs provide regular contact with patients, they offer an ideal platform for delivering oral health education, fluoride application, and referrals to dental care. Such integration could significantly reduce the long-term burden of oral disease in this high-risk group.

5. STUDY LIMITATION

Notably, while bivariate analyses suggested associations with gender, marital status, self-employment, and toothbrush use, none of these remained statistically significant after multivariate adjustment. This discrepancy likely reflects confounding by stronger predictors (*e.g.*, education and hygiene behaviors), highlighting the importance of multivariate modeling in identifying true independent risk factors. The low representation of women (20.2%) further limits the reliability of gender-based conclusions, a limitation that should be addressed in future studies through targeted recruitment [14, 15].

CONCLUSION

This study identifies four independent predictors of impaired OHRQoL among individuals with a history of drug abuse, including age over 45 years, illiteracy, lack of dental floss use, and early initiation of drug use. These findings emphasize that oral health in this population is shaped not only by addiction itself but also by educational disadvantage and modifiable hygiene behaviors.

We recommend that oral health promotion, particularly education on interdental cleaning, be systematically integrated into addiction treatment programs. Future research should employ longitudinal, multicenter designs with balanced gender representation, clinical oral examinations (*e.g.*, DMFT, CPI), and assessment of mental health and access-to-care barriers to strengthen causal inference and inform targeted interventions. By addressing these modifiable factors, healthcare systems can significantly improve both oral and overall quality of life for individuals recovering from substance use disorders.

AUTHORS' CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: P.P.: Study conception and design; F.O.: Methodology; F.M.: Data collection; L.A.: Draft manuscript. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

OHRQoL	=	Oral Health-Related Quality of Life
OHIP-14	=	Oral Health Impact Profile-14
PR	=	Prevalence Ratio
CI	=	Confidence Interval

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Ethics Committee of Birjand University of Medical Sciences, Iran (Code: IR.BUMS.REC.1402.105).

HUMAN AND ANIMAL RIGHTS

All procedures performed in studies involving human participants were in accordance with the ethical standards of institutional and/or research committee and with the 1975 Declaration of Helsinki, as revised in 2013.

CONSENT FOR PUBLICATION

Written informed consent was obtained from all participants prior to enrollment.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

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

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None.

CONFLICT OF INTEREST

The author(s) declare no conflict of interest, financial or otherwise.

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