

# Effect of Opioids on Oral Health Status among Institutionalised Drug Addicts in a District of Rajasthan, India

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## ABSTRACT

**Introduction:** According to the World Health Organisation survey, 2004, opioid is one of the most common forms of drug used by drug abusers in India. The total number of registered opium abusers in India is estimated to be 1.4 million. The state in India with the maximum consumption of opium is seen in Punjab and Rajasthan when compared to the other states.

**Aim:** To assess the oral health status and related practices of opium drug users in Sri Ganganagar, Rajasthan, India.

**Materials and Methods:** The present cross-sectional study was conducted on 577 institutionalised adult male, drug addicts from across Rajasthan and Punjab. Comparison was made with duration of addiction to investigate any differences in oral health status. A standardised, pre-validated questionnaire was used to collect data on tooth brushing and its frequency, duration of drug abuse and oral complication like dry mouth, burning mouth, taste impairment and eating difficulty along with clinical examination to record Oral Hygiene Index-Simplified (OHI-S), Community Periodontal Index (CPI), and Decayed Missing

Filled Surface (DMFS) index. The statistical significant analysis was done by t-test, Chi-square and level of significance was set at  $p < 0.05$ . Multiple linear regression model was used to find out the association between duration of addiction and CPI, OHI-S and DMFS score.

**Results:** The mean age of the patients was  $38.2 \pm 11.89$  years. Maximum addiction was seen in the age group of 18-24 years ( $n=158$ , 27.4%). Significantly higher mean scores of OHI-S, CPI, Decayed Missing Filled Teeth (DMFT) and DMFS score were reported among the patient on drug abuse of opioids for more than five years. Around half of the patients reported brushing their teeth at least once. Multiple linear regression model showed very high DMFS score which were associated with longer duration of drug addiction and no tooth brushing.

**Conclusion:** The present study demonstrates poor oral health behaviour, worse periodontal health and higher caries experience among opium abusers, it is important to develop a specialised awareness protocol towards oral healthcare for the societies where such drug dependency is widespread.

**Keywords:** Drug addiction, Opium, Oral hygiene

## INTRODUCTION

In today's world, drug abuse can be considered as a prevalent and unsafe public health problem. Globally, the numbers of drug addicts using illegal drugs at least once a year reported in 2009 were between 149 and 272 million among age between 15 to 64-year-old. The substances or drugs, may be natural or synthetic, the use of which has a psychoactive effect and alters or modifies the functions of a living organism [1]. In India by 2007, 11.35 million persons were addicted to drugs [2].

Opioid is one of the most common forms of drug, used by drug abusers in India. According to World Health Organisation survey 2006, the total number of registered opium abusers in India is estimated to be 1.4 million [3].

Opioid was previously known as opiates, derived naturally from the opium poppy (*Papaver somniferum*). Opioid include synthetic and naturally occurring peptide drug. The term poppy means "sleep inducing". This plant is cheap as it is easy to grow and does not require costly fertilizer, insecticides or fungicides [4].

Opium is mostly used for various medicine preparations in India. The opium provided by the Government is in the powdered form of dried poppy fruit. Rajput clan of Rajasthan used opium mainly to reduce haemorrhage and calm their anxiety during war times. It was also used for a long time as a mind altering drug and as an analgesic on the Indo-Pakistan sub-continent [4]. In Rajasthan, districts of Barmer, Srigangangar, Hanumangarh, Jodhpur and Bikaner are known for high consumption of opium [5]. The state in

India with the maximum consumption of opium is seen in Punjab and Rajasthan [6].

The people who use opioid have an induced state of euphoria as well as mental detachment. General side effects with opioid drug use are nausea, vomiting and constipation together with the risk of hypotension and respiratory depression. Oral side effects include salivary hypofunction which include a dry or burning mouth (which may lead to dental caries), taste impairment and eating difficulties [7].

Very few studies have reported the oral health status among drug abusers especially among opium users [8,9]. Therefore, the aim of the present study was to assess the oral health status and related practices of opium drug users in Sri Ganganagar, Rajasthan, India.

## MATERIALS AND METHODS

Sri Ganganagar district was selected for the present study as it is situated in the north western part of Rajasthan where consumption of drugs has been reported highly and cases regarding illegal trafficking are also being reported in abundance towards Punjab and Haryana in last few years [5]. The present cross-sectional study was conducted at the Non Governmental Organisation (NGO) involved in the rehabilitation of alcohol and substance abusers during the month of November 2015 to March 2016 among male adult drug addicts. Ethical approval to conduct the study was obtained from the Institutional Ethical Review Board. Written informed consent was obtained from the participants after explaining them the aim

and objectives of the study.

The principal investigator explained the aim of the research and the content of the questionnaire to the concerned NGOs. Confidentiality and privacy of data were explained and guaranteed to the participants.

The questionnaire was piloted to find out the face validity, and few adjustments and modification were made in the questionnaire before its application. Cronbach coefficient was found to be 0.80, which showed satisfactory internal reliability of the questionnaire. The questionnaire included various habits such as tooth brushing and its frequency, duration of drug abuse and oral complication like dry mouth, burning mouth, taste impairment and eating difficulty.

The pilot study was conducted on 50 subjects to estimate the sample size of the study. In the pilot study, prevalence of dental caries was 56%.

Sample size was calculated using the formula:

$$n = z^2 pq / d^2$$

[where n=sample size, p=prevalence of dental caries among drug abuser (56%), q=free of dental caries [100-p (56%) = 44%], d=allowable error (1.96), z=point on normal deviation (0.05)]. On calculation "n" was equal to 379 which was rounded off to 400.

A response rate of 51% was found in the pilot study and thus, to collect data from 400 subjects, the final sample size was estimated to be 595 (to compensate in case of loss/non response of the subjects).

A total of 595 participants were targeted for the survey. The inclusion criteria for the study was that, subjects were using drugs at least twice in a week, having features of tolerance, withdrawal symptoms and continued use despite social, economic and medical problems. Occasional users and uncooperative subjects were excluded from the study. The total sample of 580 participants, participated in the first phase of the study and answered questions related to their oral health.

Data collection was done through face-to-face interviews using a standardised questionnaire two days prior to study. The clinical examination was conducted by a single calibrated examiner for whom kappa statistics was determined 88%. World Health Organisation Type III Examination [10] was carried, using the World Health Organisation probe, natural light, mouth mirror, explorer and patients were seated in well illuminated room. After the interview, examiner conducted clinical examination to record debris and calculus according to the OHI-S [11], periodontal status, dental caries and mucosal lesions were recorded according to CPI [12], DMFS index [13].

## STATISTICAL ANALYSIS

The data were analysed with IBM SPSS (Statistical Package for the Social Sciences) Statistics Windows, Version 20.0. (Armonk, NY: IBM Corp) was used for the statistical analysis. The statistical analysis was determined by the t-test, chi-square and multiple linear regression models to find out the association between duration of addiction and CPI, OHI-S and DMFS score and level of significance was set at p<0.05.

## RESULTS

Among 580 dentate patients who completed the questionnaire, 3 did not agree to be interviewed resulting in a sample size of 577 participants. The mean age of the patients was 38.2±11.89 years. Their background characteristics and addiction history are presented in [Table/Fig-1]. Results were dichotomised into duration of addiction, more than five years and less than five years. Total 333 participants opium abusers, less than five years and 244 participants were drug abusers for more than five year. Maximum addiction seen in the age group of 18-24 years, (n=158, 27.4%) and almost half of

the participants completed their primary education (n=256, 44.4%) and (n=504, 87.3%) patients were employed. Around half of the patients reported brushing their teeth at least once daily (n=302, 52.3%) and (n=245, 42.5%) did not brush their teeth.

[Table/Fig-2] presents mean and standard deviation of oral health status among participants in which OHI-S, CPI When compared, the mean difference among opium abusers with duration of addiction less than five year and more than five year was found to be highly significant (p<0.001) in relation to oral health status.

Variable	Duration of drug abuse (<5 year) 333 (n)	Duration of drug abuse (>5 year) 244 (n)	Total n (%) 577
<b>Age (years)</b>			
18-24	86	72	158 (27.4%)
25-34	81	61	142 (24.6%)
35-44	74	56	130 (22.5%)
45-54	59	21	80 (13.9%)
55≤	33	34	67 (11.6%)
<b>Education status</b>			
No education	57	37	94 (16.3%)
Primary	145	111	256 (44.4%)
Secondary	47	39	86 (14.9%)
College/Faculty	84	57	141 (24.4%)
<b>Employment status</b>			
Employed	286	218	504 (87.3%)
Unemployed	47	26	73 (12.7%)
<b>Tooth brushing</b>			
Yes	217	115	332 (57.5%)
No	116	129	245 (42.5%)
<b>Frequency</b>			
Once daily	199	103	302 (52.3%)
Twice daily	13	8	21 (3.6%)
Not every day	5	4	9 (1.6%)
None	116	129	245 (42.5%)

**[Table/Fig-1]:** Background characteristics and addiction history.

Dental Status	Duration of drug abuse (<5 year)	Duration of drug abuse (>5 year)	p-value <sup>a</sup>
	Mean±SD	Mean±SD	
Debris index	0.82±0.67	1.58±1.21	<0.01*
Calculus index	0.77±0.78	1.38±1.18	<0.01*
OHI-S	1.59±0.59	2.96±1.16	<0.01*
CPI	1.81±0.68	3.15±1.21	<0.001*

**[Table/Fig-2]:** Relationship of oral health status indices with duration of the opium abuse.

<sup>a</sup>t-test, \*p<0.05 (statistically significant)

Dental status	Duration of drug abuse (<5 year)	Duration of drug abuse (>5 year)	p-value <sup>a</sup>
	Mean±SD	Mean±SD	
Decayed Teeth	3.11±3.76	6.17±7.62	<0.01*
Missing Teeth	0.36±0.59	0.39±0.34	0.4766
Filled Teeth	0.1±0.32	0.04±0.12	0.005*
DMFT	3.57±3.98	6.60±6.24	<0.01*
Decayed Surface	3.97±4.06	7.05±8.89	<0.001*
Missing Surface	0.44±0.79	0.52±0.43	0.15
Filled Surface	0.1±0.32	0.04±0.12	0.005*
DMFS	4.51±4.16	7.61±8.92	<0.001*

**[Table/Fig-3]:** Relationship of dental dental caries experience with duration of the abuse among opium abusers.

<sup>a</sup>t-test \*p<0.05 (statistically significant)

[Table/Fig-3] presents mean and standard deviation of dental status among participants in which DMFT and DMFS is more among the patient abuse opium more than five years. DT and DS were highest among the participants abusing more than five year. When compared, the mean difference among opium abusers with duration of addiction less than five year and more than five year was found to be statistically significant ( $p < 0.05$ ) in relation to oral health status.

[Table/Fig-4] shows the basic complication occurring in the oral cavity due to opium abuse. Comparatively, complications like burning mouth, taste impairment, eating difficulties and mucosal

Complications	Duration of drug abuse (<5 year) n (%)	Duration of drug abuse (>5 year) n (%)	Total n (%)
Dry mouth	239 (71.7%)	214 (87.7%)	453 (78.5%)
Burning mouth	108 (32.4%)	121 (49.5%)	229 (39.7%)
Taste impairment	196 (58.8%)	207 (84.8%)	403 (69.8%)
Eating difficulties	83 (24.9%)	191 (78.2%)	274 (47.5%)
Mucosal infections	11 (3.3%)	76 (31.1%)	87 (15.1%)
Chi-square	74.14		
p-value	<0.05*		

**[Table/Fig-4]:** Basic complication occurring in the oral cavity due to opium abuse.  
\* $p < 0.05$  (statistically significant)

infections are predominantly seen in the individuals having duration of drug abuse more than five years than those who are consuming opium less than five years. Most common complication was dry mouth ( $n=453$ , 78.5%) followed by taste impairment ( $n=403$ , 69.8%). The statistical significant difference ( $p < 0.05$ ) was observed for occurrence of basic complications among drug abuser with different duration of addiction.

[Table/Fig-5] represents multiple linear regression analysis, which was executed to estimate the linear relationship between CPI,

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	SE	R <sup>2</sup> Change	p-value
<b>CPI</b>						
1	0.54	0.41	0.41	3.72	0.40	<0.01*
2	0.62	0.49	0.49	3.74	0.04	0.04*
3	0.67	0.55	0.55	3.77	0.06	0.01*
<b>OHI-S</b>						
1	0.52	0.40	0.40	3.69	0.40	<0.01*
2	0.58	0.46	0.46	3.73	0.04	0.04*
3	0.64	0.50	0.50	3.77	0.06	<0.01*
<b>DMFS</b>						
1	0.56	0.42	0.42	3.70	0.42	<0.01*
2	0.62	0.48	0.48	3.75	0.06	0.01*
3	0.68	0.58	0.58	3.8	0.08	0.01*

**[Table/Fig-5]:** Multiple linear regression model for CPI, OHI-S and DMFS.

\* $p < 0.05$  (statistically significant)

1 Predictors: Duration of drug abuse >5 year

2 Predictors: Duration of drug abuse <5 year

3 Predictors: No tooth brushing

OHI-S, DMFS and various independent variables. The analysis revealed that the duration of drug abuse >5 year ( $p < 0.01$ ) was the best predictor for poor OHI-S, periodontal problems and increase in DMFS followed by duration of drug abuse <5 year.

## DISCUSSION

Oral health diseases are common in drug abusers because of the neglect shown by drug abusers is due to its addiction and therefore requires serious attention. The topic of oral health; however, has not been addressed sufficiently among opium addicts, when compared to their general health. This study to the best of the knowledge of authors would be a pioneer study revealing the individual effect of

opium on oral health. Combined effect of illicit drugs on oral health has been published earlier in abundance, however their results cannot be justified and hence comparison made in the present study was only to understand the gravity of the situation.

The present study showed alarming results with young adults of 18-24 years found considerably in high number consuming opium as drug of addiction 27.4%. Next age group with maximum number of addicts was 25-34 years with 24.6% addicts. This pattern of young adults consuming drugs in maximum number was also reported by Shekarchizadeh H et al., [14] with 25-34 years and Gupta T et al., [9] with 31-40 years individuals consuming drugs in abundance. This may be explained by curiosity, experimentation, self-medication for stress and ease of availability of such products.

Only 11.6% of the population belonging to 55 years and above age group were consuming opium in the present study. In the present study, 42.5% of the addicts reported had no habit of brushing which was in contrast with findings of Rooban T et al., [2] with 100% of the addict population brushing at least once a day. However, in another study among addicts conducted in Delhi, reported similar results of present study with 52% of the population not having any oral hygiene habit [9].

In present study, maximum numbers (256, 44.4%) of the drug addicts were having primary education which might have lead to poor oral health literacy and thus no habit of brushing. Such health behaviour may further cause poorer oral health and complications.

There were studies which have previously documented periodontal health status among drug abusers [15,16]. Mean CPI score among addicts, consuming drugs for more than five years ( $3.15 \pm 1.21$ ) is much more than what was being reported for addicts consuming less than five years ( $1.81 \pm 0.68$ ). Similar finding are being reported by Gupta T et al., [9], Singh K et al., [16] in regards to community periodontal index. This could be due to the immunosuppressive effects of opioids which potentially altered microbial profiles and causes a rapid diseases progression in periodontal tissue [7]. So, the duration of drug increase, its effect is clearly seen on periodontal health.

High mean OHI-S scores are being reported among opium abusers in the present study with  $2.96 \pm 1.16$  among addicts consuming for more than five years which is similar to another study by Gupta T et al., ( $3.80 \pm 1.06$ ) [9]. This higher OHI-S scores among drug abusers in the present study could be due to two major reason according to author, one, the oral hygiene practices are very poor among this group due to the socioeconomic constrains and secondly the euphoric state in which the addicts are, it is difficult to practice proper oral hygiene practices.

In the present study, the dental decay was examined by DMFS index in which the mean decayed surface score was significantly higher among the addicts abusing opium for more than five years, ( $7.05 \pm 8.89$ ). The overall mean DMFS was significantly higher among the addicts consuming opioids for more than five year ( $7.61 \pm 8.92$ ). This difference in disease prevalence could be due to the fact that opiates are xerostomic and thus can reduce the saliva production and its protective effect against dental decay [17]. The study done by Mohammadi TM et al., on opium addicts show that those who were opium addicts have more DMFT as compare to those who were non-opium addicts [18]. Furthermore, Mysels DJ and Sullivan MA realised that frequent use of opium was associated with higher sugar consumption, justifying the higher number of dental caries in this group [19]. Likewise, Rooban T et al., noted poor oral hygiene as the cause of higher DMFT in opium abusers [2].

Researchers have found that the complication like oral mucosal lesion are most common problem in the drug abusers [2,20] but in present study, complication of dry mouth (78.5%) and taste impairment (69.8%) were seen more than the mucosal lesions (15.1%). The well accepted side effect of opioids causing salivary

hypofunction can be a reason behind this common oral problems presented in the present study according to the authors.

The present findings should have implications for oral health promotion among addicts through targeting of these specific subgroups. General practitioners and specialists in substance abuse should advocate of oral healthcare and integrate it into general care treatment settings and educational programs which are being designed for such special groups. There should be integration of oral health components into existing national policies or programmes like de-addiction programme by the Ministry of Health and family Welfare. Special dental clinics in rehabilitation centres must render the promotive, preventive and curative services. Lastly, modification of existing dental curriculum to focus more on oral health problems due to drugs abuse for better preparedness of the dentist.

## LIMITATION

The findings of this study reflect the oral health status of group of opium drug users from a single geographical zone. India is a nation with diverse socio-cultural and regional variations. Therefore, further multicentric studies in the country are recommended to get a more comprehensive picture about the kind of drug used and the characteristics of drug abuse, may play an important role towards oral health. Another limitation for the study was the possibility of social desirability bias, while answering the questions on drug use and oral health practices, cannot be ruled out due to interview based administration of the questionnaire. However, measures were taken to reduce the bias by conducting interview in privacy in the hospital premises and assuring confidentiality of data.

## CONCLUSION

Opioid use leads to oral as well as general medical problems. The present study demonstrates poor oral health behaviour among opium abusers, especially those with less educated as being at greatest risk for oral diseases. The opium drug users had inadequate oral hygiene practices, poor periodontal health; higher caries experience. Educational and preventive strategies on oral health, should be integrated into other care provided for addicts. It is important to develop a specialised awareness protocol towards oral healthcare for the societies where such drug dependency is widespread.

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