

## Oral Health Status and Subjective Complaint of Oral Dryness of Methadone User at Jakarta Drug Dependence Hospital - Indonesia

Mohammad Reza<sup>1</sup>, Gus Permana Subita<sup>2\*</sup>, Siti Aliyah Pradono<sup>2</sup>

1. Oral Medicine Residency Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

2. Department of Oral Medicine, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

### Abstract

There is shortage of data on the oral health status of former heroin users who are currently on treatment in Indonesia. To address this limitation, the aim of the present study was to investigate and analyze the oral health status and oral dryness complaint in former heroin users who are currently on methadone treatment at a hospital drug dependence in Jakarta. Subject included in the study were patients treated with methadone following heroin addiction. Oral health examination was performed with a dental explorer and dental inspection mirror. Xerostomic status was determined with Fox xerostomic inventory questionnaire. Additionally the decayed-missing-filling teeth (DMF-T) and oral hygiene index-simplified (OHI-S) were used. A total of 37 patients (33 male, 4 female) were included. The mean age was 38.3, ranging between 31 and 53 years old. Mean number of DMF-T were: decayed  $3.54 \pm 3.22$  (SD); missing  $11.62 \pm 8.84$  (SD); filling  $0.12 \pm 0.73$  (SD). The mean score of OHI-S was  $2.20 \pm 0.93$  (SD). We observed that 70.3% of methadone users reported no xerostomia vs. 29.7% of users. Oral health status in former heroin users currently on methadone treatment was poor, while xerostomia was found in low number among methadone users.

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### Introduction

Recent years have seen an increase of health problems due to abuse of narcotics, alcohol, and other addictive substances. According to United Nations on Drugs and Crime (UNODC), in 2016 29 million people worldwide abused of drugs. In 2017, Jakarta ranked as the Indonesian city with the highest prevalence of drug abuse (3.4%). Heroin was the fifth most frequently used narcotic after marijuana, methamphetamine, alcohol, and ecstasy.<sup>1</sup>

While some countries have seen a decrease of heroin use due to supply problems and high price,<sup>2</sup> must be noted that opioid dependence including heroin is the most potent addiction. Specifically opioid dependence is very dangerous physically and psychologically compared to other substances.<sup>3</sup> In 2015, 70% of

drug-related deaths were heroin users.<sup>2</sup> The therapy used for heroin dependence is both psychosocial and pharmacological with methadone and buprenorphine. The goal is to prevent harm and improve the patient's quality of life and social interactions.<sup>4,5</sup> Pharmacologically, methadone treatment is more effective than drug withdrawal therapy or opioid antagonist therapy. Additionally it is inexpensive and very useful in preventing the spread of Human Immunodeficiency Virus (HIV) through needle sharing.<sup>6,7</sup>

Methadone is a synthetic opioid agonist, i.e it can produce effects similar to heroin, morphine and other opioids. The main differences from heroin are: absence of an euphoria effect; oral administration; long action; has withdrawal symptoms 24 hours after use.<sup>8,9</sup> Oral side effects of methadone use include: xerostomia-; methadone mouth; changes in food choices with preference for food with food rich in sugar and lacking fiber; immunosuppression; periodontal disease; bruxism.<sup>10,11</sup> Initial side effects linked to methadone use include: sleep disturbances; nausea; vomiting; constipation; sexual dysfunction; menstrual disorders; weight gain. Methadone mouth is an extreme dental and oral condition observed in long-term users

#### \*Corresponding author:

Gus Permana Subita

Department of Oral Medicine,

Faculty of Dentistry, Universitas Indonesia,

Jakarta, Indonesia.

E-mail: guspermana11@gmail.com

of methadone characterized by rapid tooth decay accompanied by progressive caries.<sup>12</sup> The occurrence of dental caries in drug abusers is linked to salivary gland hypofunction, immune system dysfunction, increased amount of carbohydrate consumption and poor oral hygiene.<sup>13</sup> Often, individuals with a history of heroin use and treated with methadone are: HIV positive; smoking cigarette; drink alcohol; use drugs that have xerogenic effects.<sup>5,11,14-16</sup>

Although several of methadone's side effects well known, currently no data available on the oral health status of methadone users in Indonesia along with some variables that accompanies it. In order to overcome this limitation, the purpose of this study was to report the various oral health conditions and the xerostomic status of former heroin users treated with methadone in Indonesia. The present study was conducted at Jakarta Drug Dependence Hospital which is owned by the Ministry of Health of the Republic Indonesia. This hospital specializes in service for the referral and care of drug addicted patients.

## Methods

Specifically, all former heroin users currently on methadone treatment in Jakarta Drug Dependence Hospital were included in the study. We performed a cross sectional study of heroin users respondents and calculated the sample in 42 individuals. This study protocol was approved by the Research Ethics Committee of Dentistry Universitas Indonesia (*No 10/Ethical approval/FKGUI/II/2018*). All of the subjects signed an informed consent form. Of the 42 patients, 37 completed the study. Specifically, in the course of the study, two residents died and three of them refused to participate.

## Data Collection

Oral health examination was performed using a dental explorer and dental inspection mirror. The status of oral hygiene was measured using the Simplified Oral Hygiene Index (OHI-S)

and the dental status was determined by the Decay Missing Filling Tooth Index (DMF-T) method with a range of values between 0 and 28.<sup>17,18</sup>; both indices were performed by 2 people. The third of the molar teeth were not involved in the recording. Along with the numerical data, DMF-T values are also categorized into two groups, specifically maximal value of  $DMF-T \leq 7$  and  $>7$ . These values represent 25% of the 28 teeth damaged or with caries.<sup>19</sup> DMF-T values indicate the magnitude of caries prevalence.<sup>18</sup> According to the World Health Organization (WHO), in permanent teeth DMF-T values consist of 4 categories: very low ( $<5.0$ ), low (5.0-8.9), moderate (9.0-13.9), and high ( $>13.9$ ).<sup>18</sup>

Following the oral examination, patients receive a questionnaire. The first part of survey covered area such as: smoking habits; dentist visits; current drug abuse status, daily dose and duration of methadone treatment. The second part of survey regarded xerostomia symptoms with reference to Fox *et al's* questionnaire which consisted in 4 questions with yes or no answers.<sup>20</sup> Question were adapted to the needs of the present study and divided into 4 categories namely: no xerostomia, mild xerostomia, moderate xerostomia and severe xerostomia.<sup>21</sup>

## Statistical Analysis

Fischer, Kolgomorov-Smirnov and Mann-Whitney Test were the statistical tests used to examine the relationship between oral health and xerostomic status with history of dose and duration of methadone treatment. The statistical analysis was supported by IBM SPSS Statistic version 23.

Table 1 reports the present condition in methadone treated patients in relation with their habits associated with their dental health. The mean age of these subjects was 38.3 years, ranging from 31 to 53 years old. The status of smokers in methadone treated patients showed a maximum of  $DMF-T > 7$  higher than the maximum on  $DMF-T \leq 7$ .

Sociodemographics	Frequency n(%)	Mean Value of Decay, Missing, Filling Tooth & DMF-T (mean±SD)				Max Value of DMF-T n(%)	
		D	M	F	DMF-T	≤ 7	> 7
<b>Age</b>							
25-34 year	7 (18.9)	6.5 ±4.7	11.7 ±10	0±0	1.2 ±11.8	2 (22.2)	5 (17.9)
≥ 35 year	30 (81.1)	2.8 ±2.3	11.6±8.7	0.2±0.8	14.6 ±9.1	7 (77.8)	23 (82.1)
<b>Sex</b>							
Male	33 (89.2)	3.5 ±3.3	11.3 ±8.8	0.15 ±0.7	15 ±9.5	8 (88.9)	25 (89.3)
Female	4 (10.8)	3.5 ±1.9	13.7±10.0	0.5 ±1	17.7 ±11.8	1 (11.1)	3 (10.7)
<b>Cigarette Smoking Status</b>							
Current Smoker	36 (97.3)	3.6 ±3.2	11.4 ±8.9	0.1 ±0.7	15.2 ±9.7	9 (100)	27 (96.4)
Former Smoker	1 (2.71)	0 ±0	0 ±0	0±0	0±0	0 (0)	1 (3.60)
<b>Alcohol Drinker Status</b>							
Never Drinker	10 (27.0)	4.2 ±3.1	15 ±9.8	0.3 ±0.6	19.2 ±10.1	2 (22.2)	8 (28.6)
Former Drinker	10 (27.0)	4.4 ±4.3	8.2 ±5.2	0.5 ±1.4	12.9 ±7.8	2 (22.2)	8 (28.6)
Infrequent Drinker	9 (24.3)	2.7 ±2.4	12.8±10.4	0 ±0	15.5 ±12.0	3 (33.3)	6 (21.4)
Light Drinker	9 (21.6)	2.5 ±2.3	10.2 ±8.9	0 ±0	13.2 ±8.1	2 (22.2)	6 (21.4)
<b>Frequency of Dental Visits</b>							
Never visited to dentist	22 (59.5)	4.1 ±2.8	12.6 ±9.0	0.18 ±0.8	16.9 ±9.3	4 (44.0)	18 (64.3)
Once per year	6 (16.2)	2.5 ±1.7	12.8 ±7.8	0.3 ±0.8	15.5 ±8.7	1 (11.1)	5 (17.9)
< Once every 2 years	9 (24.3)	2.8 ±4.6	8.3 ±9.1	0.1 ±0.3	11.2 ±10.6	4 (44.4)	5 (17.9)
<b>Tooth Brushed</b>							
less than once per day	6 (16.2)	5.3(2.5)	16.3 (5.3)	0.17 (0.4)	21.8(6.0)	0 (0)	6 (21.4)
between 1 to 3 times per day	31 (83.8)	3.1 (3.2)	10.7 (9.1)	0.19 (0.7)	14.1 (9.7)	9 (100)	22 (78.6)
TOTAL	37 (100)						

**Table 1.** Comparison Of Data With Sociodemographic Status Of Dental Health And The Maximum Rate of DMF-T.

The status of alcohol drinkers indicates a higher tendency to tooth decay in such individual. In the infrequent and light drinker cases, a decrease in caries progress could be observe, while a large number of missing teeth was linked to different alcohol drinking styles. However, study population treated with methadone that had not drunk alcohol had similar DMF-T categories compared to the alcohol-drinkers group falling into the high category. More than 50% of methadone users do not visit the dentist regularly or at all. The tooth-brushing status showed that the distribution of caries and missing teeth performed by the methadone users and the highest value of DMFT > 7 were based on those who claimed to brush their teeth every day.

Table 2. Association of oral hygiene, dental status, current drug abuse and xerostomia status compared with dose and duration of methadone treated individuals.

In table 2, the prevalence of oral hygiene status was higher in moderate OHI-S status and also spread more in methadone dose > 120 mg with a treatment period of over 2 years. However, bivariate testing showed no difference ( $p > 0.05$ ). Tooth decay higher than 25% was observed in the group using methadone at a dose > 120 mg followed by the group that underwent methadone treatment > 2 years. However, bivariate tests on dose and duration of methadone treatment variables showed no difference ( $p > 0.05$ ). The current drug abuser status (benzodiazepines, clozapine, amphetamines and cannabis) was approximately half of the total study population. The current and former drug users were evenly distributed in the methadone treatment group with a dose of > 120 mg. The prevalence of current users increased six times between the methadone treatment ≤ 2 years and > 2 years.

VARIABLE	Frequency n(%)	Methadone Dose (MD) n(%)		Duration of Methadone Treatment (DM) n(%)		P value*	
		≤ 120 mg	>120mg	≤ 2years	>2 years	MD*	DM*
<b>Oral Hygiene Status based on OHI-S</b>						0.363	0.531
Poor	5 (13.5)	1 (7.7)	4 (16.7)	1 (50.0)	4 (11.4)		
Moderate	29 (78.4)	12 (92.3)	17 (70.8)	1 (50.0)	28 (80.0)		
Good	3 (8.1)	0 (0)	3 (12.5)	0 (0)	3 (8.6)		
<b>Tooth Status based on Maximum DMF-T Value</b>						0.465	0.512
Max Value of DMF-T ≤ 7	9 (24.3)	5 (38.5)	6 (25.0)	1 (50.0)	10 (28.6)		
Max Value of DMF-T > 7	28 (75.7)	8 (61.5)	18 (75.0)	1 (50.0)	25 (71.4)		
<b>Current Drug Abuse Status (benzodiazepin, clozapin, amphetamin, canabis)</b>						0.074	0,137
Former User	23 (62.2)	11 (84.6)	12 (50.0)	0 (0)	23 (65.7)		
Current User	14 (37.8)	2 (15.4)	12 (50.0)	2 (100)	12 (34.3)		
<b>Xerostomia Status</b>						0.298	0.570
No xerostomia	26 (70.3)	10 (76.9)	16 (66.7)	1 (50.0)	25 (71.4)		
Mild xerostomia	7 (18.9)	2 (15.4)	5 (20.8)	0 (0)	7 (20.0)		
Moderate xerostomia	2 (5.4)	0 (0)	2 (8.3)	0 (0)	2 (5.7)		
Severe xerostomia	2 (5.4)	1 (7.7)	1 (4.2)	1 (50.0)	1 (2.9)		
<b>TOTAL</b>	<b>37 (100)</b>						

\*P value = Fisher Test, Kolmogorof-Smirnov Test

\*MD,DM= Methadone dose, Duration of methadone treatment

**Table 2.** Association Of Oral Hygiene, Dental Status, Current Drug Abuse And Xerostomia Status Compared With Dose And Duration Of Methadone Treated Individuals.

The prevalence of xerostomia status is most common in groups that do not have subjective complaints of dry mouth. The same prevalence conditions also exist in the status of xerostomia which is associated with the dose and length of treatment with methadone. In the group of subject treated with a methadone dose > 120 mg and methadone treatment duration > 2 years had a larger number of subject with mild xerostomia status vs. xerostomia status which has subjective complaints of oral dryness. However, both variables in the current drug abuser status and xerostomia status have no significant relationship with the dose and duration of methadone treatment ( $p > 0.05$ ).

Table 3 shows the average number of teeth in the study population with DMF-T level in the high category. Methadone users with a dose of ≤ 120 mg had a higher average of missing teeth vs. the group of > 120 mg. The mean of

DMF-T and the mean decayed teeth in both criteria were relatively balanced and included in the high category. However, no significant differences in the Mann Whitney test were observed compared to the total number of tooth decay ( $p > 0.05$ ). Methadone users with a maintenance period > 2 years had an average three times higher of decayed teeth compared to methadone user with a treatment period ≤ 2 years. Regardless of this, the number of missing teeth in the methadone users with a treatment period ≤ 2 years was higher than group treated for > 2 years and there was no significant difference was observed in both groups compared to DMF-T ( $p > 0.05$ ). The mean of tooth filling in the methadone users treated with doses > 120 mg was higher than the users treated with doses ≤ 120 mg.

CRITERIA	D	M	F	DMF-T	P value *
<b>Mean all subject</b> (n=37)	3.54±3.22	11.62±8.84	0.12±0.73	15.35±9.66	
<b>Mean subject with metadon dose</b>					
≤120mg (n= 13)	3.08±2.62	12.15±10.9	0.15±0.55	15.38±11.4	0.949
>120mg (n=24)	3.79±3.52	11.33±7.69	0.21±0.83	15.33±8.83	
<b>Mean subject with duration metadon</b>					
≤2 years (n=2)	1.5±2.12	15±18.38	0	16.5±16.26	0.736
>2 years (n=35)	3.66±3.25	11±8.94	0.2±0.75	15.29±9.53	

\* Mann Whitney Test - Criteria & DMF-T

**Table 3.** The Mean Value And Associaton of DMF-T Based On Dose And Duration Of Methadon Treatment.

VARIABLE		XEROSTOMIA STATUS				P value*
		No	Mild	Moderate	Severe	
		Xerostomia	Xerostomia	Xerostomia	Xerostomia	
		n (%)	n (%)	n (%)	n (%)	
<b>Alcohol Drinking Status</b>	Never Drinker	8 (30.8)	2 (28.6)	0 (0)	0 (0)	0.383
	Former Drinker	7 (26.9)	2 (28.6)	1 (50)	0 (0)	
	Infrequent Drinker	6 (23.1)	2 (28.6)	0 (0)	1 (50)	
	Light Drinker	5 (19.2)	1 (14.3)	1 (50)	1 (50)	
<b>Cigarette Smoking Status</b>	Current Smoker	25 (96.2)	7 (100)	2 (100)	2 (100)	-
	Former Smoker	1 (3.8)	0 (0)	0 (0)	0 (0)	
<b>Current Drug Abuse Status</b>	Former User	17 (65.4)	4 (57.1)	1 (50)	1 (50)	0.284
	Current User	9 (34.6)	3 (42.9)	1 (50)	1 (50)	

\*P value = Kolmogorov-Smirnov Test

**Table 4.** Association of Xerostomia Status With Variabel Such As: Alcohol Drinking, Cigarette Smoking, Current Drug Abuse.

In table 4, alcohol drinkers who had complaints of xerostomia were spread throughout the xerostomia group. Specifically, the majority of the study population was in the mild xerostomia group (7 people) and evenly distributed in the moderate and severe xerostomia group (2 people), However, no significant differences in the Kolgomorov-Smirnov test ( $p > 0.05$ ) were observed. Almost the entire study population was still actively smoking and only 1 person quit smoking. Xerostomia complaints were predominantly experienced by the mild xerostomia group in the smoker group and spread evenly in the other 2 groups. Statistical tests conducted on the smoker's status of the xerostomia group could not be calculated because at least data can be compared. Spesifically, there was just 1

people for former smoker in xerostomia status and the others were zero.

In the group with current drug abuse status, the study population was spread through each group of xerostomia which has subjective complaint of oral dryness with the highest number of individuals found in former user of mild xerostomia group. The highest prevalence of xerostomia status in all variables of current drug abuser status was the group of no xerostomia. A bivariate test was performed showing no significant difference ( $p > 0.05$ ).

### Discussion

Methadone mouth is a condition of the oral cavity characterized by aggressive tooth

decay activity, missing teeth, or severe caries that occurs in methadone users. Several studies reported worsening of tooth decay with lengthier use of methadone.<sup>12,22</sup> Additionally in this study, a prevalence of caries which increased with age, was observed.<sup>23,24</sup> However, the average total damage of the teeth and the duration of methadone use were not correlated. This may be linked to other factors related to the development of caries.<sup>13</sup> Of note, the decay average in methadone maintenance group treated for > 2 years was higher and the mean value was greater than the methadone user group treated for ≤ 2 years. However, the generalized and heavy amount of dental caries is also believed to be a side effect of the previous history of heroin use.<sup>10</sup> A number of causes are linked to poor oral health in former heroin users subsequently treated with methadone. These include low awareness of oral hygiene; increased sugar intake, use of drugs related to xerostomia.<sup>24</sup> While the data on consumption of sugar cannot be displayed, it is known that methadone in the form of oral syrup preparations are high in sucrose.<sup>11,22</sup> Methadone can increase the acidity of the oral cavity. This associated with the habit of keeping methadone syrup for long period of time in the oral cavity (to increase drug absorption through the mucosa) increases the risk of cavities.<sup>12,22</sup>

In the present study, awareness of oral hygiene by brushing teeth was low in a small portion of methadone treatment patients. As a consequence the average amount of tooth decay was greater than the group that had standard teeth brushing. In addition, methadone treatment patients who never visited a dentist had a higher prevalence of caries. Several factors have been shown to influence oral hygiene in methadone maintenance patients, including; lack of motivation; low self-esteem; depression; going to the dentist only if the pain is very severe.<sup>11,25</sup> The decision not to see the dentist could also be influenced by the potent analgesic effect possessed by opioids, including methadone. A visit by the dentist may be taken if the disease worsens or if the analgesic effects begin to decrease.<sup>11,22</sup>

It has been shown that methadone has the ability to suppress the salivary secretory function by interfering with the peripheral signals in parasympathetic muscarinic receptors.<sup>26</sup> Additionally, the use of serogenic anti-depressant

or anti-psychotic drugs in heroin using patients under methadone maintenance, also causes complaints of xerostomia.<sup>27</sup> Methadone maintenance treatment is lengthy and methadone amounts are gradually increased until the maintenance dosage is achieved.<sup>28</sup> Based on the dose and length of methadone treatment, we observe that the group of patients using a larger dose > 120 mg for > 2 years, had a higher population in each category of the oral hygiene status vs. the group that uses the dose ≤ 120 mg and ≤ 2 years. These results were similar to the tooth status based on the maximum DMF-T value, current drug abuse status and xerostomic status. Of note, all of these variables showed no significant relationship between the dose size and duration of methadone treatment. All of the above conditions may be linked to the nature of initial methadone side effects, including dry mouth. Following long-term administration, the effect will decrease, however complaints of constipation, sexual dysfunction and sweating will persist.<sup>8,29</sup>

In the methadone treated group with dosage ≥ 120 mg and duration treatment > 2 years, we observed an increase in the mean of decay, and filling, along with a decrease in the mean of missing and DMF-T vs. the methadone treated group with dosage ≤ 120 mg and duration of treatment ≤ 2 years. However, no significant differences were observed between the two types of dose groups and the duration of methadone treatment with respect to the DMF-T value. Such a scenario may be explained by user's behavioural changes while using methadone and a gradual dose increase has been able to overcome the severe withdrawal phase. It has been shown that patients performing methadone maintenance for more than a year tend to experience positive behavior changes with regard to work, education, or personal habits. Additionally, further improvements are seen in the following year.<sup>30</sup> Specifically, we observed a higher awareness of caring for teeth with fillings in groups that undertook maintenance for > 2 years.

In this study the habit of smoking and drinking alcohol had a high prevalence in the category of dental damage. Nicotine substances contained in cigarettes can affect the quality of saliva causing it to become thicker by interfering with the parotid salivary gland's function. This is generally compensated by the production of mucous saliva by the submandibular and

sublingual salivary glands.<sup>31,32</sup> Parotid salivary atrophy is a side effect that has also been reported in long-term alcohol drinkers.<sup>33</sup> Disorders of the salivary glands with subjective complaints, including xerostomia can lead to caries emergence. However, in the present study, no significant relationship was observed between xerostomia, smoking and alcohol drinking status. Interestingly, the risk of xerostomia was observed in the light drinker and current smoker groups. These results may be due to the lack of data on the study population necessary to perform a comprehensive comparison and calculation among these groups.

In addition, xerostomia was not related to the dose and duration of methadone treatment. However, while xerostomia occurred with the use of doses > 120 mg and for < 2 years, populations with no xerostomia remain in higher number than those with xerostomia. Side effects linked to the long-term use and increased dosage of methadone treatment included behavioral changes characterized by a negative lifestyle<sup>30</sup> This may have led to the emergence of self-awareness to improve dental and oral health conditions. In a previous study performed in Iran on the quality of life of 32 methadone users, the authors reported that the side effects experienced actually gave a positive impression accompanied by the feeling of being healthier in absence of withdrawal symptoms, increased appetite, reduced pain and had a better dominating appearance.<sup>34</sup>

The history of not visiting dental practitioners may be also be due to economic problems and low income.<sup>24</sup> Therefore, low cost dental services are needed in order to provide: basic dental services (dental fillings, endodontic, scaling or tooth extraction); free of charge consultation, motivation and education on teeth brushing and self-check.

## Conclusion

Oral health status in former heroin users currently on methadone treatment was poor, while xerostomia had a low incidence in methadone users. Comprehensive steps need to be taken to deal with dental and oral complaints in heroin users under methadone maintenance.

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## Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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