ORIGINAL ARTICLE

Correlation of xerostomia in methadone therapy program patient with oral health related quality of life using oral health impact profile-14: a cross-sectional study

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ABSTRACT

Introduction: Methadone Therapy Program (MTP) patients receive treatment with antidepressants which work as salivary flow inhibitors that promote xerostomia. Decreased salivary secretion affects several essential aspects of life quality, such as speaking, chewing, and food swallowing. It also increases the risk of rampant caries. This study aimed to analyze correlation of xerostomia in MTP with Oral Health Related Quality of Life (OHRQoL) using the Oral Health Impact Profile (OHI-P 14). **Methods:** Type of research was a cross-sectional design, this study's main independent variable was xerostomia, the dependent variable was OHRQoL, and the confounders were age, gender, education, occupation, caries status, oral hygiene status, history of HIV infection, smoking habits, and alcohol consumption. Data analysis used logistic regression to see the risk factors that influence OHRQoL. **Results**: Xerostomia is a subjective dry mouth complaint asked through a questionnaire. Of the 26 respondents, 13 (50%) reported dry mouth. Salivary Flow Rate (SFR) measurement showed the result of 13 people was <0.3 (hyposalivation). OHrQOL was measured using OHI-P 14 questionnaire, 12 respondents had good OHRQoL (score > 6.5) and 13 respondents had bad (score ≤6.5). Risk factors associated with OHRQoL were age (p=0.08) and duration of methadone consumption (p=0.06). **Conclusion:** There is no correlation between xerostomia in MTP with Oral Health Related Quality of Life (OHRQoL) using the Oral Health Impact Profile (OHI-P 14). Future research should involve several hospitals that carry out MTP so that the research results are more valid.

KEYWORDS

methadone, oral health related quality of life, OHrQOL, OHIP-14, xerostomia

INTRODUCTION

Psychoactive substance abuse remains a serious public health problem. According to a study in 2014, the prevalence of drug abuse in Indonesia accounts for about 3.8 to 4.1 million people, which is equal to 2.1 to 2.25% of Indonesian population.[1] The prevalence of drug abuse increased following the so-called 'iceberg phenomenon', namely the actual number of cases is greater than number of the reported cases.[2] Marijuana, methamphetamine, ecstasy and heroin were the most commonly seized substances. Formerly the most abused substances were alcohol, psychotropics, and marijuana, then it shifted to substances administered through injection.[3] Persons who inject drugs (PWID) have a high risk for hepatitis, HIV/ AIDS and other infectious diseases, such as bone infection, arthritis, endocarditis, sepsis, soft tissue infection and tetanus due to unsafe injection practices.[4]

'Narkoba' in Indonesian is an abbreviation for narcotics and illicit harmful drugs/ substances. Narcotics are substances (plant-based or non plant-based, synthetic or semi-synthetic) that can alter consciousness, reduce sensibility and

pain, and also can lead to addiction. In addition, narcotics can change brain structure and function, particularly in the central nervous system, which can affect thinking, memory, concentration, perception, feeling and behavior.[5]

A long term comprehensive management is needed to treat drug addiction as craving is often a part of the recovery process. One of the medical treatments in drug addiction is Methadone Therapy Program (MTP) program. In this program, people with opioid (heroin) dependence are given methadone as a substitution for opioid. Methadone is relatively safer, and therefore can help to reduce harm in the addiction treatment.[1]

The MTP program has two goals. Firstly, it helps recovery from opioid addiction by acting as a substitute. Methadone dosage is then reduced gradually in a certain period of time. Secondly, MTP contributed to breaking the transmission chain of HIV/AIDS among PWID.[6] Opioid (such as heroin and morphine) stimulates μ-receptor in the brain to release dopamine. Methadone is a full synthetic opioid agonist medication that also stimulates μ-receptor, and thus can act as a substitute for opioid. Methadone is not a curative agent for opioid dependence. The patients are still opioid-dependent.[7] The most common side effects of methadone are constipation and hyperhidrosis. Other side effects are sedation, nausea, vertigo, pruritus, decreased libido in males and sexual dysfunction.[8]

Oral manifestation occurred during the MTP program can be caused by side effects of methadone or residual effect of heroin. Heroin addiction can lead to xerostomia and hypoglycemia. These conditions contribute to an increase in high sugar diet and subsequently rampant caries.[4] Saliva plays an important role in dental and oral health. Saliva acts as an antimicrobial defense system. As an effective remineralization process also involves saliva, saliva secretory disorder can lead to dental caries. Amilase, a saliva component, plays a role in food digestion, hydrates mucosa and removes food debris particles.

Saliva is a lubricative agent in oral mucosa, playing an essential role in speech, chewing and swallowing foods as well as preventing injury on the surface of oral mucosa. Saliva secretion depends almost entirely on a nerve-mediated mechanism. Parasympathetic impulse which activates glandular muscarinic receptors is the main stimulus for secreting fluid from salivary glands. Methadone and other opioids suppress saliva secretion by interfering neuronal transmission in the central and peripheral nervous system. Methadone can also affect the autonomic nervous system, which regulates uncontrollable physiological processes like saliva production.

Methadone delays this mechanism, which has an impact on saliva production. Patients undergoing MTP program are usually prescribed antidepressants, which may also inhibit saliva secretion and therefore induce xerostomia.[5,9,10] Xerostomia is defined as a subjective perception of oral dryness. Some studies reported that not all xerostomia cases had hyposalivation, and the mechanism remains unknown. Hyposalivation affects some important aspects of daily life, such as speech process, chewing and swallowing food, insomnia and an increased risk for rampant caries. Symptoms due to xerostomia may contribute to decreased quality of life.[11,12]

According to the World Health Organization (WHO), quality of life is "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns". Concept of health does not necessarily indicate the absence of disease, but also includes health and well-being physically, mentally (psychologically) and socially.[10] The quality of life of patients can be evaluated using several parameters, and these parameters can also be used to evaluate the quality of life in relation to dental health. The Oral Health Impact Profile (OHIP 14) is a well-accepted and validated research tool that is frequently used for evaluating the quality of life related to the oral cavity. A reliable indicator of oral health-related quality of life (OHRQoL) is the OHIP. Each of the seven

OHRQoL dimensions consists of two items, total of 14 questions (OHIP-14). The seven dimensions measured were functional limitations (D1), pain (D2), psychological discomfort (D3), physical (D4) and psychological (D5) disabilities, social disabilities (D6), and handicaps (D7). The overall OHIP-14 score ranges from 0 to 56, with a higher score indicating a lower quality of life.[13]

OHRQoL in those in rehabilitation will mostly be worse compared to the general population. Generally, the most common complaints are difficulty eating and sleeping or relaxing. This is suspected to be related to salivary function in the oral cavity that is not running normally and these kinds of things can be measured using the OHIP-14.[14] Hyposalivation can affect patients' physical and psychological aspects.[15] MTP program was first implemented in Indonesia in year 2003-2005 through a pilot project in Rumah Sakit Ketergantungan Obat (RSKO) Jakarta and Rumah Sakit Sanglah Bali. To date MTP program in Indonesia is available in 79 clinics in hospitals, primary care and detention centers/ prisons.[16] MTP program is often considered beneficial in terms of reduction of morbidity and mortality due to HIV. However, it is also important to evaluate quality of life in patients undergoing the MTP program.

Holistic approach in oral health-related quality of life among patients in MTP programs having xerostomia has not been studied yet. This study was conducted in a national addiction center (namely Rumah Sakit Ketergantungan Obat), given that the hospital manages the MTP program in Indonesia. This study aimed to analyze correlation of xerostomia in MTP with Oral Health Related Quality of Life (OHRQoL) using the Oral Health Impact Profile (OHI-P 14).

METHODS

Type of research was a cross-sectional study. The independent variable was xerostomia, while the dependent variable was oral health-related quality of life (OHRQoL: OHI-P 14). Confounding variables were sex, age, education level, job, the length of methadone treatment, methadone dosage, presence of HIV infection, smoking habit, number of cigarettes, and alcohol consumption. Data collection was conducted in April and May 2019.

A non-probability sampling technique (total sampling) was used in this study, in which patients who met the inclusion and exclusion criteria were included in the analysis. The sample size was not calculated in this study. The inclusion criteria were patients who were in MTP and conscious, while the exclusion criteria were patients who were not willing to participate in the research.

Primary data from questionnaires, saliva tests, intraoral examinations were collected. Secondary data were taken from medical records. Data collection was conducted as follows: prospective participants came to the MTP program clinic to consume methadone in front of a clinic officer, then they were invited to the study 15-30 minutes after methadone administration. They signed informed consent if they agreed to participate in the study.

Data on demographic and quality of life related to dental and oral health was collected through an interview. Before collecting saliva samples, participants were instructed to be relaxed and not swallow saliva for one minute. Thereafter, they were asked to spit the saliva into a measuring cup. This procedure was repeated two times. The collected saliva was measured and categorized.[17] Dental caries status was checked using the DMFT index while oral hygiene was checked using the OHI-S index. Intraoral examination was carried out by a dentist. After finishing all the assessments, a souvenir was given to each participant.

OHRQoL was measured by the Oral Health Impact Profile (OHIP-14) that consisted of three latent variables, namely functional limitation, pain, and psychological impact. The list of questions on OHI-P 14 can be seen in Table 1.

Table 1. The list of questions on OHI-P 14

No	OHIP-14 Domain	Question
1	Functional Limitation	1. Have you ever had trouble pronouncing any words because of problems with your oral cavity?
		2. Have you ever felt that your sense of taste has worsened because of problems with your oral cavity?
2	Physical Pain	3. Have you ever had a painful aching in your mouth?
		4. Have you ever found it uncomfortable to eat any foods because of problems in the oral cavity?
3	Psychological Discomfort	5. Have you ever been self-conscious because of problems in your oral cavity?
		6. Have you ever felt tense because of problems with your oral cavity?
4	Physical Disability	7. Have you ever felt dissatisfied with the food you consumed because of problems with your oral cavity?
		8. Have you ever had to interrupt meals because of problems in the oral cavity?
5	Psychological Disability	9. Have you ever found it difficult to relax because of problems in the oral cavity?
		10. Have you ever been a bit embarrassed because of problems with your oral cavity?
6	Social Disability	11. Have you ever been a bit irritable with other people because of problems in the oral cavity?
		12. Have you ever had difficulty doing your usual jobs because of problems with your oral cavity?
7	Handicap	13. Have you ever felt that life in general was less satisfying because of problems with your oral cavity?
		14. Have you ever been totally unable to function because of oral problems?

The study participants were instructed to give a score (between 0 and 4) for each statement, with score criteria as follows: 0 (Never experienced it), 1 (Had ever experienced it once), 2 (Had ever experienced it 2-3 times), 3 (Had ever experienced it 4-5 times), and 4 (Had ever experienced it more than five times).

Cronbach alpha coefficient was calculated in the reliability test to assess the consistency of the measurement. The Cronbach alpha coefficient was 0.750 for functional limitation, 0.865 for pain, 0.887 for psychological impact. Since the coefficients were higher than 0.7, we concluded that measurements for the latent variables were reliable.

Data normality test was conducted on numerical scale data, specifically length of methadone treatment and DMFT score. The results of the Shapiro-Wilk test were normal for both variables, which were length of methadone use ($p = 0.5348$) and DMFT score ($p = 0.3859$). Multivariate analysis in this research used logistic regression to determine the relationship between one or more independent variables and one dependent variable, which would later also be used for forecasting. In this study, researchers used a significance level of 10% to avoid erroneous conclusions in drawing conclusions.[16] No intervention was performed to the study participants in the present study. To comply with ethical conduct in research, confidentiality in patients' identities was applied.

RESULTS

The total number of patients who participated in MTP at this hospital was 39 patients, and 26 patients participated in the study. A total of 7 patients was excluded due to hospitalization in the rehabilitation unit, in prison or have been allowed to take home doses so that the frequency of visiting the clinic to take methadone was only once a week. The population in this study was small so the research sample was also small. The characteristics of the study participants are shown in Table 2.

Table 2. Characteristics of the study participants

No	Variables	Sample (n=26)	Percentage (%)	Mean	SD	Min-Max
1	Gender					
	Female	2	7.69			
	Male	24	92.31			
2	Age			39.19	4.74	31-53
3	Education level					
	Primary and Elementary School	5	19.23			
	Senior High School and University	21	80.77			
4	Job					
	Laborer	3	11.54			
	Lecturer	1	3.85			
	Freelancer	2	7.69			
	Driver	5	19.23			
	Household assistant	2	7.69			
	Employee	2	7.69			
	NGO	1	3.85			
	Security	1	3.85			
	Entrepreneur	6	23.08			
	Not working	2	7.69			
5	Length of methadone treatment (months)			81.3	38.2	0-141
6	Methadone Dosage (mg)			134	75.4	11-350
7	HIV infection					
	No	9	34.62			
	Yes	16	65.38			
8	Smoking history					
	No	0	0			
	Yes	26	100			
9	Number of cigarettes					
	6-15 cigarettes	24	92.31			
	>15 cigarettes	2	7.69			
10	Alcohol consumption					
	No	20	76.92			
	Yes	6	23.08			

Most of the participants were males (92.31%, n = 24) and the mean age of the participants was 39 years of age. The highest proportion of education level was senior high school and universities (80.77%, n = 21). The most common job was entrepreneur (28.08%, n = 6). The mean length of methadone treatment was 38.2 months with mean dosage of 75.4. HIV infection was reported by 16 participants. All participants had a smoking history. Most participants smoked 6-9 cigarettes per day. Alcohol consumption was reported by 20 participants (76.92%). In the study, oral health and saliva profile were also assessed. The results are shown in Table 3.

Dental caries assessment showed that the mean number of caries teeth per participant was 20 teeth. More than half of the participants (53.83%, n = 14) had moderate oral hygiene, and 3 participants could not be assessed due to missing many index teeth.

Xerostomia, the main independent variable in this study, was assessed subjectively (by interviewing the participants) and objectively (through salivary flow rate examination). The results are shown in Table 2 Xerostomia is defined as a subjective perception of dry mouth, assessed using a questionnaire. According to the questionnaire, xerostomia was reported by 13 participants (50%). An objective assessment to calculate saliva flow rate (SFR) was performed, subsequently. According to the SFR test, 13 participants had SFR less than 0.3 (hyposalivation). In the next section the variable that will be used is SFR.

Table 3. Oral health profile and saliva assessment

No	Variables	Sample (n=26)	Percentage (%)	Mean	SD	Min-max
1	DMF-T score			20	8.8	2-32
2	Oral hygiene			39.19	4.74	31-53
	Good	9	34.62			
	Moderate	14	53.84			
	Could not be assessed	3	11.54			
3	Xerostomia					
	No	13	50			
	Yes	13	50			
4	Salivary Flow Rate					
	<0,3 (hiposalivation)	13	50			
	0,3-0,5 (normal)	6	23.08			
	>0,5 (hipersalivation)	7	26.92			

OHRQoL was measured by the Oral Health Impact Profile (OHIP-14). Quality of life is categorized based on the mean patient score, namely 6.5. Respondent with a score of >6.5 meaning good quality of life and a score of ≤6.5 meaning poor quality of life. OHRQoL results can be seen in table 4.

Table 4. OHRQoL's result

No	Variables	Sample (n=26)	Percentage (%)
1	Oral Health Related Quality of Life		
	Good	12	48
	Poor	13	52

Multivariate analysis in this research used logistic regression to determine the relationship between one or more independent variables and one dependent variable, which will later also be used for forecasting. One method that can be used to get the best regression model is the Akaike's Information Criterion (AIC) method. The advantage of this method is mainly in selecting the best regression model which can also explain the suitability of the model to existing data and values that will occur in the future. The AIC Score can be seen in table 4.

Table 5. Results of the logistic regression model

Model	Variable	Coefficient	AIC score
1	Constant	8.119	36.755
	Age	0.842	
	Education level	2.613	
	Length of methadone treatment	0.092	
	HIV infection		
	Number of cigarettes	2.957	
	Alcohol consumption	28.514	
	SFR	5.871	
	DMFT score	0.330	
	Xerostomia	0.074	
	Methadone dosage	19.743	
		0.039	
2	Constant	0.382	34.638
	Age	0.559	
	Education level	1.70	
	Length of methadone treatment	0.07	
	HIV infection		
	Number of cigarettes	0.522	
	Alcohol consumption	26.409	
	SFR	1.801	
	DMFT score	2.087	
		0.092	

Table 5 showed that when including all variables the AIC score was 34.638 and when excluding the variables xerostomia and methadone dose the AIC score was 36.755. The best model is with the lowest score.

Table 6. Multivariate analysis of factors affecting OHRQoL

Variable	Coefficient	p-value	OR
Constants	0.382	0.999	
Age	0.559	0.087*	0.572
Education	1.7	0.493	5.478
Length of methadone treatment	0.07	0.066*	0.932
HIV infection	0.522	0.752	1.686
Number of cigarettes	26.409	0.994	2.948
Alcohol consumption	1.8	0.443	0.165
Salivary Flow Rate	2.087	0.261	8.062
DMF-T Score	0.009	0.365	0.991

Table 6 shows that there was no interaction between xerostomia patient causing methadone consumption and Oral Health Related Quality of Life (OHRQoL: OHI-P 14). Factors that are significantly associated with OHRQoL are age and length of methadone treatment ($p < 0.1$). The younger the age, the better the quality of life (OR = 0.572) and the respondents who received methadone treatment in the short term also had a better quality of life (OR = 0.9).

DISCUSSION

Methadone Therapy Program (MTP) is one of the opioid replacement therapies needed by opioid addicts to control their addictive behavior.[18,19] The most common side effects of methadone are constipation and hyperhidrosis. Other side effects are sedation, nausea, vertigo, pruritus, decreased libido in males and sexual dysfunction.[9,20] This therapy has a side effect that can cause hyposalivation. This hyposalivation can cause dry mouth (xerostomia).[20] The research results in table 3 show that 13 of the 26 respondents said they experienced xerostomia and hyposalivation. Xerostomia can also trigger the caries process. Someone who experiences chronic hyposalivation will feel uncomfortable in the oral cavity because the amount of saliva that has a role as a lubricant decreases. Therefore, various functions in the oral cavity can also be disrupted.[1, 21]

Methadone can suppress the function of salivary secretion or hyposalivation by interfering with peripheral signals from parasympathetic muscarinic receptors. Complaints of xerostomia in people who are on methadone therapy can also be caused by the use of estrogenic antidepressant drugs or antipsychotic drugs which are also consumed during therapy 50% and objectively the respondents who are in the hyposalivation category are also 50%. Therefore, it can be seen that the other half of the respondents did not experience problems with the function of salivary secretion. Pasiga et al study showed that the volume of saliva produced by respondents who were undergoing rehabilitation was lower than the volume of saliva produced by respondents who had never consumed illegal drugs and were not undergoing rehabilitation, although the difference in volume in the study was not too different.[22]

The results of this study are not in line with the results of Aukstakalnis& Tomas' study which showed that more than half of the respondents who received methadone therapy, namely 76%, did not feel symptoms of dry mouth and the respondents had no problems with the quantity of saliva.[23] This study was similar to the results of Reza et al which showed that 70.3% of respondents who were receiving methadone therapy did not experience xerostomia. The side effects of methadone can vary because it also depends on the duration of use and the dose of methadone given.[6]

Saliva plays an important role in dental and oral health, namely in the process of lubrication and protection, the buffer system, and the anti-bacterial, digestion, and mastication processes. Therefore, if saliva changes characteristics, the salivary function will be affected, thus affecting dental and oral health. One of them is if the flow of saliva is reduced, it can trigger a state of dry mouth or xerostomia.[22]

Most people are still not aware of the impact that can be caused by xerostomia. Without realizing it, xerostomia can reduce the level of oral hygiene

because this condition can cause plaque formation to develop properly. Plaque formation has several adverse effects on the hard and soft tissues of the oral cavity. In addition, xerostomia can also make it difficult for a person to swallow and speak so in the end, it can reduce a person's quality of life.[23]

Table 3 shows that the average DMFT value of the research sample was 20 with a maximum DMFT value of 32. The results of this study were in line with Maria & Diyah's research. It was found that the average Decay Missing Filled-Tooth (DMF-T) score in the MTP respondent group was in the very high category compared to the control group which was in the low category. In addition, the salivary pH in the MTP group is known to be more acidic than the control group. The decrease in the amount of salivary flow causes the pH to become acidic which triggers higher caries in MTP respondents.[24] Research by Shekarchizadeh et al obtained similar results, namely the average DMF-T value in respondents who were being treated at the Methadone Treatment Center in Tehran was 20,3. The average DMF-T score was two times higher than that of the general public in Tehran.[25] This was in line with the results of this study which showed an average DMF-T score of 20. The average DMF-T score in this research was also included in the very high category.

Oral hygiene for these respondents is very important because respondents are vulnerable to oral diseases. Oral hygiene is the responsibility of each patient but many patients who are on methadone therapy neglect oral hygiene. Many factors affect the oral hygiene of MTP patients such as lack of motivation, depression, and embarrassment. Hence, they feel inferior, only going to the dentist when they feel severe pain and others.[10, 26] The results in Table 3 show that the highest frequency of oral hygiene for respondents was in the medium category, namely 53.84%. The results of Aukstakalnis & and Tomas' research showed that the majority of respondents in the study had poor oral hygiene. From this study, it was found that respondents who had never visited a dentist had the highest frequency, namely 45%.[23] Reza et al's study showed that the highest frequency was in the medium oral hygiene status of 78.4%.[6]

Based on the results of Amiri & Hajar's research, it was known that OHRQoL measured using OHIP showed worse results for respondents who are currently in the rehabilitation period compared to the general public in the area. In daily activities, the prevalence of OHIP is most disturbed, namely difficulty eating.[27] The results of this study were similar to those of Astrom et al which showed that the OHRQoL of respondents who were undergoing rehabilitation were mostly poor. The most adverse effects experienced were difficulty eating and sleeping or being in a relaxed state.[28] This was in line with the results of this study in Table 4 which showed that the percentage of respondents' OHRQoL was slightly higher in the bad category, namely 52%. This could happen because there was a function in the oral cavity, especially saliva, which did not work normally so it could affect the level of a person's quality of life.Multivariate analysis uses logistic regression looking at the AIC score. The results showed that when including all variables the AIC score was 34.63803 and when excluding the variables xerostomia and methadone dose the AIC score was 36.75512. The best model was the one with the lowest score and can be seen in table 5. The methadone dose in this study was also not related to quality of life. The numbers of research respondents who had good and poor quality of life were almost the same, namely 12% and 13% (Table 4). The methadone dose is the dose consumed at the time of data collection.[33] Future research needs to consider a better research design so that the data can be more complete.

Factors significantly related to OHRQoL in this study shown in Table 6 were age and duration of methadone use. It is known that the younger the respondent's age, the better the quality of life of the respondent. Respondents who had been treated with methadone for a short period had a better quality of life. OHRQoL can change along with changes in oral health status and the condition of each individual at various ages. OHRQoL can get worse with age

which can be seen from the OHIP-14 score with a decreasing score with age. This is because with increasing age various diseases can appear, including a decrease in the health condition of the oral cavity.[29, 30] The results of this study was in line with Fei et all. research showed that one of the factors that worsened the quality of life of the respondents was age older than 50 years.

Respondents who are currently undergoing methadone therapy, and are aged 50 years and over, mostly experience health and mental problems.[31] This study was not in line with the results of Saki et al's study which showed that many factors were not significantly related to OHRQoL, one of which was age. This study showed significant results for the types of drugs consumed.[32] The results of this study were in line with the results of Fei et al's study which found that the quality of life of respondents who used methadone for longer time did not experience a greater increase compared to respondents who used methadone relatively in a shorter time. Other studies have also shown similar results that long-term use of methadone showed a less consistent quality of life.[31]

Our results suggested that MTP is one of the therapies to treat addiction and from this research, it could be seen that patients who were more mature and had been following this therapy for longer time had a good quality of life. The limitation of this research was the small sample size so the research results could not be generalized to other populations. The research location, namely RSKO Cibubur, already had several satellite hospitals so there were not too many patients undergoing MTP.

CONCLUSION

There is no correlation between xerostomia in MTP with Oral Health Related Quality of Life (OHRQoL: OHI-P 14). Other risk factors that correlate with xerostomia are age and duration of methadone consumption. An Implication of the research is recommending policy makers and related parties to add oral health education and treatment activities to the MTP program, considering that almost all MTP patients have problems in their oral cavity.

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