

Oral Sexual Behavior and Oral Hygiene Effects on the Syphilis Incidence in MSM Population

Rani Handayani¹, Gus Permana Subita^{2*}, Masita Mandasar²,
Febrina Rahmayanti², Anandina Irmagita Soegyanto²

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

The aim of this study was to determine the effects of oral sexual behavior and oral hygiene maintenance on the incidence of syphilis in men who have sex with men (MSM) at Voluntary Counseling and Testing in Cibodasari Public Health Center (PHC) in Tangerang City, Indonesia. This was an observational analytical study with case-control design in subjects from the MSM community listed in the PHC from January to December 2017. The participants disclosed their sexual practices and oral hygiene maintenance in the preceding 12 months by using a self-reported questionnaire. Of the 96 respondents, 81.2% were ≤ 30 years old, 88.5% were unmarried, 67.7% had attained a high school education, and 68.8% were employees. We compared the participants who had syphilis with a control group regarding their sexual behavior. Multivariate analysis revealed four variables that contributed to syphilis: oral-penis sex ($P=.019$; OR = 61.306), commercial sex ($P=.002$; OR = 61.296), use of antibiotics ($P=.009$; OR = 26.853), and use of mouthwash ($P=.048$; OR = 11.581). Oral sexual behavior and oral hygiene maintenance among MSM who had visited Cibodasari PHC contributed to an increased incidence of syphilis.

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Introduction

Sexually transmitted infections (**STIs**) are one of the most common global health problems and include 10.6 million cases of syphilis. Syphilis is a systemic disease caused by the spirochete *Treponema pallidum*, for which curative treatment is available. Several studies have recently reported increased incidences of syphilis, particularly in certain populations, especially in communities of men who have sex with men (**MSM**) in many parts of the world.^{1,2} According to the Centers for Disease Control and Prevention in the USA, in 2015–2016, the national primary and secondary syphilis rate increased to 8.7 cases per 100,000 population, the highest rate reported since 1993.³ In 2009, it was reported

that 2% of the US population were MSM, and among this population, 62% had early syphilis.⁴ In 2013, the Integrated Study of Behavioral Biology (**ISBB**) held by the Indonesian Ministry of Health showed that in 2009 through 2013, there was an increasing prevalence of syphilis in MSM of approximately 2%–6% in three big cities of Indonesia: Yogyakarta, Tangerang, and Makassar.⁵

The term MSM is a behavioral term that refers to biological males who have sex with other biological males, regardless of sexual orientation or gender identity.^{6,7} Between 2005 and 2008, several Southeast Asian countries have reported data on their MSM populations: 766,000 in Indonesia, 240,000 in Myanmar, 560,000 in Thailand, and 5% and 10% of the total population in Singapore.⁷ In Indonesia, there were 1,095,970 MSM among all provinces in 2012. West Java was the province with the highest number of MSM followed by Central Java and DKI Jakarta.⁸

Oral sexual behavior is an indispensable factor in the analysis of STI transmission risk factors in the MSM population. Oral sex is an

*Corresponding author:

Gus Permana Subita
Department of Oral Medicine,
Faculty of Dentistry, Universitas Indonesia
Jakarta, Indonesia
E-mail: guspermana11@gmail.com

extremely predominant sexual practice in MSM. Over 90% of MSM in San Francisco have reported this behavior.⁹ Previously, oral sexual behavior was regarded as a less risky sexual practice. However, in recent years, there has been an awareness that oral sexual behavior has the same risks as other sexual behaviors.¹⁰ Transmission of syphilis during oral sex is relatively easy and thought to be a moderately common cause of transmission. Oral sex has been a concern as a significant mode of transmission of syphilis and was a contributor to the 15% syphilis infection in one US city.¹¹ There are various methods of preventing infection during oral sex, including oral hygiene and those related to dental issues.¹⁰ Personal oral hygiene maintenance, such as tooth brushing and using mouthwash, is performed to reduce oral bacteria, remove food remnants, and decrease oral malodor, which is also thought to enhance comfort in oral sex practice.

In Indonesia, there has been no study about the relationship between oral hygiene behavior and the incidence of syphilis in MSM. Hence, this study investigated the effects of oral sex and oral hygiene maintenance behaviors on the incidence of syphilis in MSM to provide information for use by health workers, policy makers, and education.

Material and Methods

This study has been approved by Research Ethics Committee Faculty of Dentistry Universitas Indonesia. We conducted an observational analytical study with a case-control design and consecutive sampling from March to April 2018 at Cibodasari Public Health Center (PHC) in Tangerang City that has been running an MSM friendly program. The study population was defined as the MSM listed in the Cibodasari PHC between January and December 2017. The inclusion criteria for the participants were MSM aged 15–44 years and diagnosed as only having syphilis. The control participants had no STIs.

The participants' personal information, including STI diagnosis and medication, were collected as secondary data from the PHC. The participants were asked to complete an ISBB questionnaire that included sociodemographic and historical data about

their sexual behavior, sexual activities in the past year, and oral hygiene maintenance related to sexual activity. Subsequently, the data were statistically analyzed by using SPSS software (IBM, USA).

Results

Between January and December of 2017, a total of 874 MSM visited the Cibodasari PHC. We recruited 96 respondents: 44 syphilis case respondents and 52 control respondents.

Sociodemographic Profile

Table 1 shows the distribution of the 96 MSM who participated in the study. Most subjects were <30 years old (81.2%), and their educational level was predominantly senior high school (67.7%). Most (88.5%) of the respondents were unmarried and worked as employees (68.8%).

Sociodemographic Profile	n	%
Age (years)		
≤25	39	40.6
26–30	39	40.6
31–40	14	14.6
>40	4	4.2
Education		
Elementary School	4	4.2
Junior High School	8	8.3
Senior High School	65	67.7
Diploma	5	5.2
Bachelor/Bachelor's Degree	13	13.5
Master/Master's Degree	1	1.0
Marital Status		
Unmarried	85	88.5
Widower	6	6.3
Married	5	5.2
Occupation		
Freelancer	1	1.0
College Student	4	4.2
Student	1	1.0
Employee	66	68.8
Unemployed	3	3.1
Entrepreneur	21	21.9

Table 1. Distribution of Respondents Based on Personal Characteristics (N = 96)

Sexual Behavior

Sexual behaviors recorded in this study on the ISBB questionnaire included risky sexual behavior, sexual orientation, and oral hygiene behavior related to sexual intercourse. Table 2 shows the logistic regression analysis results for the respondents' sexual behavior.

Oral–penis sexual intercourse was associated with a statistically significant higher probability of syphilis (OR, 61.306) than those for other sexual activities, although these activities were distributed similarly among the respondents in both groups. Commercial sex was associated with a statistically significant higher probability of syphilis (OR, 61.296).

Oral Hygiene Maintenance Behavior Related to Sexual Intercourse

Table 3 shows the distribution of oral hygiene behavior related to sexual intercourse in MSM with and without syphilis or other STIs

in the last 12 months. Most respondents in both the case and control groups did not take antibiotics before and after sexual intercourse. Logistic regression analysis showed that not taking antibiotics increased the probability of syphilis infection (OR, 26.853). The respondents in both groups routinely brushed their teeth before and after sexual intercourse, but this habit was not associated with syphilis in any way. There were more respondents in the case group who used mouthwash (84.1%), and the use of mouthwash contributed to the incidence of syphilis (OR, 11.581).

Sexual Behavior		Group		Total	P≤.005	OR
		Cases (Syphilis)	Control (Non-syphilis)			
Oral–Anal	No	16 (36.4%)	31 (59.6%)	47 (49.0%)	0.147	5.188
	Yes	28 (63.6%)	21 (40.4%)	49 (51%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Oral–Penis	No	4 (9.15)	14 (26.9%)	18 (18.8%)	0.019	61.306
	Yes	40 (90.9%)	38 (73.1%)	78 (81.3%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Oral–Vaginal	No	39 (88.6%)	46 (88.5%)	85 (88.5%)	0.698	-0.296
	Yes	5 (11.4%)	6 (11.5%)	11 (11.5%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Oral–Oral	No	0 (0%)	0 (0%)	0(0%)		
	Yes	44 (100%)	52 (100%)	96 (100%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Penis–Anal	No	1 (2.3%)	5 (9.6%)	6 (6.3%)	0.444	4.808
	Yes	43 (97.7%)	47 (90.4%)	90 (93.8%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Penis–Vaginal	No	36 (81.8%)	41 (78.8%)	77 (80.2%)	0.552	5.329
	Yes	8 (18.2%)	11 (21.2%)	19 (19.8%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Regular Partner	No	15 (34.1%)	24 (46.2%)	39 (40.6%)	0.429	2.344
	Yes	29 (65.9%)	28 (53.8%)	57 (59.4%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Casual Partner	No	7 (15.9%)	10 (19.2%)	17 (17.7%)	0.159	-0.178
	Yes	37 (84.1%)	42 (80.8%)	79 (82.3%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Commercial Sex	No	26 (59.1%)	48 (92.3%)	74 (77.1%)	0.002	61.296
	Yes	18 (40.9%)	4 (7.7%)	22 (22.9%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Sex Party	No	38 (86.4%)	51 (98.1%)	89 (92.7%)	0.687	1.934
	Yes	6 (13.6%)	1 (1.9%)	7 (7.3%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Use of Condoms	No	10 (22.7%)	4 (7.7%)	14 (14.6%)	0.155	-0.071
	Yes	34 (77.3%)	48 (92.3%)	82 (85.4%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Use of Lubricant	No	11 (25%)	6 (11.5%)	17 (17.7%)	0.277	-0.146
	Yes	33 (75%)	46 (88.5%)	79 (82.3%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Sex Orientation	No answers	2 (66.7%)	1 (33.3%)	3 (100%)	0.323	0.459
	Gay	25 (49.1%)	26 (50.9%)	51 (100%)		
	Bisexual	17 (40.5%)	25 (59.5%)	42 (100%)		
	Total	44 (45.8%)	52 (45.8%)	96 (100%)		

Table 2. Distribution of Sexual Behaviors

		Group		Total	P-value	OR
		Case (Syphilis)	Control (Non-syphilis)			
Using Antibiotic	No	32 (72.7%)	43 (82.7%)	75 (78.1%)	0.009*	26.853
	Yes	12 (27.3%)	9 (17.3%)	21 (21.9%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Brushing teeth Before Sexual Intercourse	No	14 (31.8%)	8 (15.4%)	22 (22.9%)	0.658	-0.583
	Yes	30 (68.2%)	44 (84.9%)	74 (77.1%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Brushing teeth After Sexual Intercourse	No	11 (25%)	4 (7.7%)	15 (15.6%)	0.883	-0.792
	Yes	33 (75%)	48 (92.3%)	81 (84.4%)		
	Total	44 (100%)	52 (100%)	96 (100%)		
Using Mouthwash	No	7 (15.9%)	25 (48.1%)	32 (33.3%)	0.048	11.581
	Yes	37 (84.1%)	27 (51.9%)	64 (66.7%)		
	Total	44 (100%)	52 (100%)	96 (100%)		

Table 3. Oral Hygiene Maintenance Behavior Related to Sexual Intercourse. * $P \leq 0.05$

Discussion

Studies on the MSM population in Indonesia are scarce relative to those in other countries because of Indonesian culture, which still considers MSM to be a taboo. This attitude might have caused reluctance in the MSM population to participate in our study and to eventually have contributed to the small number of respondents. In this study, most of the respondents were <30 years old, single, high school graduates, and employed. These data are similar to that of the ISBB obtained by the Indonesian Health Ministry in 2013.⁵

Oral sex has become increasingly popular across all age groups since the sexual revolution began in the 1960s.¹² Currently, oral sex is a mutual sexual practice in MSM of various ages. Oral sex refers to sexual activities related to the stimulation of the genitalia and anus by using the mouth, tongue, and teeth. There are different types of oral sex activities, such as fellatio (oral stimulation of the penis), cunnilingus (oral stimulation of the vagina), and anilingus (oral stimulation of the anus).^{10,13} Table 2 shows that the frequency of MSM fellatio in the preceding 12 months was higher than the frequencies of other types of oral sex and increased the syphilis incidence 61-fold.

It is well known that an STI, including syphilis, can be transmitted through oral sex. Recently, syphilis has been increasing, and

unprotected oral sex is a major contributor. Syphilis can be clinically manifested as a painless sore either on the genitals, lips, or mouth. Patients who have asymptomatic lesions may still perform oral sex, which increases the risk of oral disease transmission either through the introduction of microbes or by causing mechanical trauma to the oral cavity.¹² The condition of the lips, tongue, gums, and oral cavity is highly correlated with the transmission of infections: wounds and abrasions in the mouth, bleeding gums, gingivitis, periodontitis, and lip sores increase the chances of acquiring infection by receiving systemic circulation.¹³

Many countries have evaluated the role of oral sex in the transmission of syphilis. In Chicago, oral sex, particularly among MSM, has been found to be a substantial contributor (13.7%) to syphilis cases determined by surveillance data and interview responses. Persons who are not in a long-term monogamous relationship and perform oral sex should use barrier protection (e.g., male condoms or other barrier methods) to decrease the risk of STI transmission, such as acquiring syphilis.¹⁴ Oral sex among MSM has also been highlighted as a factor in syphilis outbreaks in Brighton and Manchester, United Kingdom, accounting for one-third of syphilis transmissions.¹⁶

In this study, we found that the control group had good compliance in using condoms (92.3%) during sex relative to that in the syphilis group (77.3%). However, we did not collect additional information on whether the respondents used condoms in every sexual activity or only at certain times. In addition, we also did not obtain information regarding oral cavity ejaculation or the presence of oral mucosal wounds.

A study from Greater Manchester in the UK showed that only a small number (7%, 12/169) of MSM used condoms at any time for oral sex, which was in stark contrast to practices for anal sex in which 95% (148/156) of the respondents reported to be using a condom. This exposed a high proportion of the respondents who practiced oral sex reporting and never used a condom, which would create a high risk for oral transmission of syphilis.¹⁷ Other reasons that prompted the lack of condom use during intercourse were young age, belief that oral sex is a safe sexual practice, or unplanned sexual intercourse. Trust in their sexual partner, sexual partner reluctance to use a condom, and alcohol intoxication were the other reasons mentioned.

The frequency and number of sexual partners also have an important role in the transmission of syphilis. In this study, other risk factors for syphilis incidence were regular/casual sexual partner, sex party participation, and commercial sex. The Indonesian Ministry of Health reported in 2013 that 50% of MSM sold sex to women or men.⁵ We showed that the case group performed more commercial sex and were more likely to contract syphilis. Advances in technology and information have facilitated increased participation in sex parties and in commercial sex through the online sexual market. MSM can also find sexual partners more easily online through dating sites and web applications.¹⁸

Oral sexual activity involves many parts of the mouth, including teeth, to stimulate a sexual partner's genitals.¹⁰ In this study, approximately 70%–90% of the respondents from both groups brushed their teeth before or after sexual intercourse. The MSM had concerns about oral hygiene during sex to provide comfort to their partner. Syphilis can be transmitted by direct contact with oral

lesions, saliva, and blood.¹⁹ Infection begins when *T. pallidum* penetrates the host, usually through intact or abraded mucous membranes.²⁰ Tooth brushing can result in small wounds in the mouth that enable syphilis contact transmission, although these wounds are not large enough for bloodstream infection, such as HIV transmission.¹² However, in this study, the multivariate analysis showed that tooth brushing was not a factor associated with syphilis incidence.

The other oral hygiene behavior explored in this study was the use of mouthwash. In this study, most of the respondents in both the case and control groups used mouthwash before and after sexual intercourse. Mouthwash agents have been compared for their activity against various types of microorganisms. Mouthwash mainly contains chlorhexidine, ethyl alcohol, sodium fluoride, potassium nitrate, and zinc chloride.²¹ Chlorhexidine is a bisbiguanide antiseptic that has a wide spectrum of bactericidal activity encompassing gram-positive and gram-negative bacteria.²² Against our expectation, the statistical analysis showed that the use of mouthwash increased the incidence of syphilis.

Syphilis is effectively treated by antibiotics, and there is a perception among MSM that consumption of antibiotics during sexual intercourse is protective against syphilis infection. Antibiotics are also readily accessible in Indonesian pharmacies even without a doctor's prescription, so there is an overuse of antibiotics among MSM. The absence of a syphilis vaccine also reinforces the misperceptions about the effectiveness of antibiotics for preventing syphilis. Syphilis control is largely dependent on avoidance of risky sexual behaviors, identification and avoidance of infected individuals, and treatment of these individuals and their contacts with antibiotics.¹⁵

The limitation of this study might not represent the findings in the general population because only a small number of MSM responded to the questionnaire in this study. Studies with longer durations and larger sample sizes may give better representation of the incidence of and associated risk factors for syphilis in Indonesian MSM. This study was also conducted over a short period, which also

might have limited subject recruitment. Another limitation is that there was the possibility of sexual behavior history recall bias.

Conclusions

To the best of our knowledge, this study was the first to analyze the associations of oral sexual behavior and oral hygiene with syphilis in Indonesian MSM. We found that oral sexual behavior and oral hygiene maintenance among MSM increased the incidence of syphilis. Further investigations in larger samples are necessary to confirm our findings.

Conflict of Interest

The authors state that there were no conflicts of interest related to this study.

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