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Duration of Work Improves Risk of Latent TB Infection in Health-Care Workers

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ABSTRACT

Background: The risk of tuberculosis among HCW were higher than another profession since the opportunity of contact with TB patients will be more frequent. The risk of LTBI were higher for people living in high burden TB country, then HCW in Indonesia have both risk. Objective: This study was done to know the risk factors for LTBI cases in HCW at infectious disease hospital. Methods : A cross-sectional study design, we examined 108 HCW at Sulianti Saroso Infectious Diseases Hospital (SSIDH), using TST with PPD RT 23 then measurement the TST after 48-72 hours. TST result with induration more than 10 mm, no TB symptoms and normal CXR will be determined as LTBI. Result : The prevalence of LTBI is 49%, as many as 53 out of 108 health workers take the TST. There were significantly different among HCW working for more than 5 years (44.5%) and before (4.6%). HCW who work for more than 5 years are 4.3 times more likely to be sick with LTBI compared to workers who work for <5 years (95% CI: 1.4 - 12.7). Conclusion: This study showed an increased risk of LTBI with long as the duration of work. Therefore it is important to improve the infection control program.

***Keywords**: latent tuberculosis infection, healthcare workers*

1. INTRODUCTION

Indonesia is the country with the second-largest burden of TB in the world, it can be ascertained that there is a fairly high number of cases of latent TB infection considering that TB is an infectious disease so people living in Indonesia have a high risk of exposure to TB germs [1-2]. Thus also the hospital as a health service facility, is a high-risk workplace for exposure to TB germs originating from TB patients when they cough, talk, sneeze, or spit and can also be from examination procedures involving TB patients or suspected TB. An increase in TB cases in hospitals will have an impact on the increased risk of TB transmission of germs. Health workers in Indonesia have both risks, so it is important to implement a TB infection control program including LTBI and TB evaluation among health workers **[2-**6].

The prevalence of LTBI among healthcare workers is high, therefore the risk of TB transmission from patients to healthcare workers is an issue that needs to be considered. Research by Joshi R, et al. (2006) showed that the prevalence of TB in health workers ranged from 69 to 5,780 per 100,000.(6) While at the Sulianti Saroso Infectious Diseases Hospital (SSIDH), as many as 10% of health workers suffered from TB within 3 years (2015-2017). Mycobacterium tuberculosis infection in individuals can be prevented by the host body's defense mechanism so that the infection remains in a latent state. However, latent infections can develop into active infections, or reactivation of active TB that has healed. Reactivation of latent tuberculosis is an important source of active infection with Mycobacterium tuberculosis. Thus, latent TB testing is one of the important steps in controlling TB disease throughout the world. It is therefore important to identify and manage latent tuberculosis infection because it can reduce the likelihood of developing active TB by as much as 90%, thereby reducing the possibility of illness [5-8].

To detect the presence of the bacteria Mycobacterium tuberculosis in a person's body, it is necessary to carry out an immunological examination as a marker of TB infection, through the examination of the Tuberculin Skin Test (TST) or Interferron Gamma Release Assay (IGRA). The aim of this research is to know the risk factors for LTBI cases in HCW at infectious disease hospital in Jakarta who treat many patients with TB, MDR TB and TB-HIV.

2. METHOD

This research is a cross-sectional study. The study population was all health workers both medical and non-medical who worked at SSIDH in 2018. Inclusion criteria:

1) had worked for more than 12 months;
2) no signs and symptoms of TB were found
3) the results of normal CXR
4) willing to carry out TST examination using PPD RT 23

The exclusion criteria are health care workers who are currently in TB treatment or have suffered from TB. Data collection was conducted in July-October 2018.

TST induration measurement is done after 48-72 hours of injection. Determination of the subject as LTBI based on the induration of TST $\geq$ 10 mm. Subjects found to have symptoms of tuberculosis and / or CXR abnormalities were further evaluated for active TB. The ethics permit was approved by the ethics committee of the Sulianti Saroso Infection Disease Hospital. Statistical analysis processing using Chi-Square.

3. RESULTS AND DISCUSSION

Table 1. LTBI Prevalence According To TST

No	TST Induration	n	%	LTBI
1.	$\geq$ 10 mm	53	49%	Positive
2.	< 10 mm	55	51%	Negative
	$\sum$	108	100%	

The prevalence of LTBI in HCW in SSIDH is 49%. Health workers who performed TST were 108 people with the characteristics: 35.2% age in the 26-35 years group and the majority sex (72.2%) were women. Other risk factors: 79.6% worked more than 5 years; 33.3% had worked in the TB room; 57.4% had contact with TB patients; 72.2% have TB scars; 74.1% always wear masks when providing services to TB patients. (Table 2)

Table 2. HCW Characteristics That Follow TST (N=108)

No	Variable		Frequency	
			N	%
1.	Age	<=25 years	16	14.8
		26-35 years	38	35.2
		36-45 years	36	33.3
		46-55 years	15	13.9
		> 55 years	3	2.8
2.	Sex	Male	30	27.8
		Female	78	72.2
3.	Duration of worked	> 5 years	86	79.6
		<=5 years	22	20.4
4.	History of working in the TB room	Yes	36	33.3
		No	72	66.7
5.	Contact with TB Patients	Yes	62	57.4
		No	46	42.6
6.	BCG Scar	No	30	27.8
		Yes	78	72.2
7.	Mask Usage	Never	3	2.8
		Always	25	23.1
		Sometimes	80	74.1

The results of the bivariate analysis found no significant difference from LTBI between age, sex, history of working in the TB room, history of contact with TB patients, BCG scars and mask use. However, there were significant differences between health workers who worked more than 5 years (44.5%) and less than 5 years (4.6%). HCW who work for more than 5 years are 4.3 times more likely to be sick with LTBI compared to workers who work for <5 years (95% CI: 1.4 - 12.7). (Table 3)

Table 3. LTBI Risk Factors HCW in SSIDH

No	Variable	LTBI		OR	CI	P
		Positive	Negative			
1.	Age					
	<=25 years	4 (3,7%)	12 (11,1%)			0,22
	26-35 years	19 (17,6%)	19 (17,6%)	1,5	0,11-21,31	
	36-45 years	22 (20,4%)	14 (13%)	0,5	0,04-5,99	
	46-55 years	7 (6,5%)	8 (7,4%)	0,3	0,03-3,84	
	> 55 years	1 (0,9%)	2 (1,9%)	0,6	0,04-7,74	
2.	Sex					
	Male	12 (11,1%)	18 (16,7%)			0,34
	Female	41 (38%)	37 (34,3%)	0,6	0,26-1,41	
3.	Duration of worked					
	> 5 years	48 (44,4%)	38 (35,2%)			**0,01**
	<=5 years	5 (4,6%)	17 (15,7%)	**4,3**	1,45-12,6	
4.	History of working in the TB room					
	Yes	17 (15,7%)	19 (17,6%)			0,95
	No	36 (33,3%)	36 (33,3%)	0,9	0,40-1,99	
5.	Contact with TB Patients					
	Yes	30 (27,8%)	32 (29,6%)			
	No	23 (21,3%)	23 (21,3%)	0,9	0,44-2,01	1,00
6.	BCG Scar					
	No	16 (14,8%)	14 (13%)			
	Yes	37 (34,3%)	41 (38%)	1,3	0,54-2,94	0,74
7.	Mask Usage					
	Never	1 (0,9%)	2 (1,9%)			0,42
	Always	15 (13,9%)	10 (9,3%)	1,7	0,15-19,7	
	Sometimes	37 (34,3%)	43 (39,8%)	0,6	0,23-1,42	

In this study it was found that the prevalence of LTBI among medical and non-medical health workers in SSIDH was quite high. The high prevalence of latent TB among health workers is in line with the high prevalence of TB in Indonesia, where Indonesia is a TB epidemic area. In addition, it is also influenced by the number of TB cases that come to SSIDH treatment both outpatient and inpatient, where SSIDH as an infectious disease referral hospital that

provides services to TB, MDR-TB and HIV-TB patients. Of course, an increase in TB cases at SSIDH will have an impact on increasing the risk of TB transmission of germs to health workers. TB cases in SSIDH in the last 3 years (2015-2017) have always been the 10 most diseases both outpatient and inpatient.

This result is in line with Martin's study (2010) which found the prevalence of latent TB in health workers (nurses) at H Adam Malik Hospital in Medan by 53% [9]. And the Fenty Anggrainy study (2016) which showed the prevalence of LTBI in officers of the Lung Lubuk Special Hospital Alung is 38.1% [10]. Likewise the results of Rajnish Joshi's research (2006) show the prevalence of LTBI among health workers, on average 54% (range 33% to 79%) [7]. Duration worked in the hospital will increase the risk of LTBI among health workers. The duration of work is related to the length of accumulation of exposure / exposure to TB germs which will increase the risk of LTBI. Sulianti Saroso Infectious Diseases Hospital as a reference for infectious diseases that provide services to patients with TB, MDR-TB and TB-HIV, is a workplace that has a high risk of TB exposure. Increasing the number of TB cases in SSIDH will certainly also have an impact on the increased risk of TB germ transmission.

Where TB germs will be removed by TB patients when they cough, talk, sneeze, or spit and can also be from the TB patient examination procedures. Long-term exposure to TB germs causes a 30% risk of TB infection [11]. It is therefore necessary to have appropriate infection prevention and control strategies and / or health monitoring for health workers on a regular basis.Contact with TB patients will be at risk for exposure to TB germs, it will certainly be at risk for TB infection and can become Latent TB. Infection can occur if exposed to TB germs exposure with an adequate dose of infection from TB sufferers and in a state of poor immune system. Efforts to prevent and control TB infection in hospitals must be done to protect health workers from exposure to TB germs, including: 1) availability of special rooms for the treatment of TB, MDR-TB and HIV-TB patients according to the standard. In a well-ventilated room, TB-contaminated air will be carried by air flow, but in a closed room (narrow), the droplets will float in the air and will increase in number each time the TB patient coughs, sneezes, talks or spit it out. 2) Compliance with the use of PPE and availability of PPE. Health care workers should provide services to TB patients who must always comply with the SPO and always use the proper PPE to prevent TB transmission. 3) Screening health workers as a high-risk group regularly with TB germs at least once a year. 4) Increase health promotion efforts for patients and visitors by providing educational information about TB disease (TB symptoms and signs, ways of transmission, TB treatment) so as to increase TB patients' awareness of always wearing personal protective equipment (masks) when they are at home or seeking treatment to the hospital [12].

4. CONCLUSION

Duration worked increases the risk of LTBI occurrence among health workers, so an infection prevention and control strategy needs to be improved which aims to prevent health workers from becoming infected with TB, especially to prevent LTBI reactivation experienced by health workers from becoming active TB.

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