Abstract

Comparison of Close and Casual Contacts with Latent Tuberculosis Infection in High School Tuberculosis Outbreaks, 2013-2017

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The diagnosis and treatment of latent tuberculosis infection (LTBI), a state of persistent immune response to stimulation by *Mycobacterium tuberculosis* antigens with no evidence of clinically manifest active tuberculosis (TB), are essential to reduce the burden of TB worldwide. Close contacts of active TB patients are at high risk of both active TB and LTBI. The risk of infection with TB depend on the infectivity and degree of contact with a TB patient. This study compared the rate of LTBI according to the degree of contact in high school TB outbreaks in Korea. The 2013 to 2017, LTBI tests of students in 44 high schools were analyzed. Of the 46,357 contacts, 43,963 were tested. Eighty seven TB patients were found, and 2,418 were diagnosed with LTBI. Of the 3,223 close contacts, 36 TB patients and 339 individuals with LTBI were diagnosed and 51 additional patients and 2,079 LTBI patients were found among the 40,840 casual contacts.

As a result of contact investigations in high schools, the incidence of additional TB patients and the LTBI rate were found to be high among close contacts, confirming that the management of close contacts is critical in the fight to eradicate TB.

Keywords : Tuberculosis, Latent tuberculosis infection, Contact investigation, Close contact, High school

Table 1. Demographic and clinical characteristics of TB patients

Unit: No. (%)

Characteristic	Total cases (n=194)	Index cases (n=107)	Newly diagnosed active TB cases (n=87)
Sex			
Male	147 (75.8)	82 (76.6)	65 (74.7)
Female	47 (24.2)	25 (23.4)	22 (25.3)
Grade*			
1st grade	37 (19.1)	18 (16.8)	19 (21.8)
2nd grade	83 (42.8)	44 (41.1)	39 (44.8)
3rd grade	74 (38.1)	45 (42.1)	29 (33.3)
Reasons for chest x-ray exam			
Health screening	151 (77.8)	72 (67.3)	79 (90.8)
TB-related symptoms	43 (22.2)	35 (32.7)	8 (9.2)
Type of tuberculosis			
Pulmonary TB	167 (86.1)	90 (84.1)	77 (88.5)
Extrapulmonary TB	20 (10.3)	11 (10.3)	9 (10.3)
Pulmonary+Extrapulmonary TB	7 (3.6)	6 (5.6)	1 (1.1)
Cavity on chest x-ray			
Normal	1 (0.5)	0 (0.0)	1 (1.1)
Cavity	27 (13.9)	16 (15.0)	11 (12.6)
No Cavity	162 (83.5)	88 (82.2)	74 (85.1)
Unknown	4 (2.1)	3 (2.8)	1 (1.1)
Status of Acid fast bacilli stain			
Smear + /Culture +	28 (14.4)	24 (22.4)	4 (4.6)
Smear + /Culture −	2 (1.0)	0 (0.0)	2 (2.3)
Smear − /Culture +	54 (27.8)	30 (28.0)	23 (26.4)
Smear − /Culture −	105 (54.1)	52 (48.6)	53 (60.9)
Unknown	6 (3.1)	1 (0.9)	5 (5.7)
Clinical manifestation			
No symptoms	126 (64.9)	54 (50.5)	72 (82.8)
Symptoms	68 (35.1)	53 (49.5)	15 (17.2)
Cough	46 (67.6)	39 (73.6)	7 (46.7)
Sputum	17 (25.0)	11 (20.8)	6 (40.0)
Chest Pain	13 (19.1)	10 (18.9)	3 (20.0)
Dyspnea	4 (5.9)	3 (5.7)	1 (6.7)
Weigh loss	2 (2.9)	2 (3.8)	0 (0.0)
Fever	8 (11.8)	5 (9.4)	3 (20.0)
Hemoptysis	7 (10.3)	5 (9.4)	2 (13.3)
Others	3 (4.4)	1 (1.9)	2 (13.3)

* In Korea, 1st, 2nd and 3rd grade in high school are the equivalent of 10th,11th and 12th grade in North America

Table 2. Results of the contact investigations according to contact factors

Unit: No. (%)

Contact Factors	Contacts (n=46,357)	LTBI tested (n=43,963)	LTBI (n=2,418)	OR (95% CI)	*P*-value
Degree of contact					
Close contact	3,223 (7.0)	3,123 (96.9)	339 (10.9)	2.26 (2.00–2.55)	0.000
Casual contact	43,134 (93.0)	40,840 (94.7)	2,079 (5.1)	Ref.	
Sex					
Male	32,520 (70.1)	30,816 (94.8)	1,699 (5.5)	1.00 (0.91–1.10)	0.930
Female	13,837 (29.9)	13,147 (95.0)	719 (5.5)	Ref.	
Region[1)]					
Gu of district in Seoul	10,161 (21.9)	9,041 (89.0)	582 (6.5)	1.02 (0.73–1.43)	0.902
Gu or district in a metropolitan city[2)]	28,513 (61.5)	27,436 (96.2)	1,451 (5.3)	0.83 (0.60–1.15)	0.255
City with a population of less than 300,000	2,624 (5.7)	2,537 (96.7)	113 (4.5)	0.69 (0.47–1.0)	0.049
An urban and rural complex in a city	4,386 (9.5)	4,337 (98.9)	234 (5.5)	0.86 (0.60–1.22)	0.388
Gun or county	673 (1.5)	612 (90.9)	38 (6.4)	Ref.	
Number of patients with TB in a school					
3–4	34,145 (73.7)	32,601 (95.5)	1,663 (5.1)	Ref.	
More than 5	12,212 (26.3)	11,362 (93.0)	755 (6.7)	1.32 (1.21–1.44)	0.000

LTBI: latent tuberculosis infection

1) Based on the placement of professionals in public health centers as of the end of 2015. Korea Centers for Diseases Control and Prevention(KCDC). 2017 Community Health Survey

2) Gu or district with a population of more than 500,000 and a city with a population of more than 300,000