



Original Article

Army Soldiers' Knowledge of, Attitude Towards, and Preventive Behavior Towards Tuberculosis in Korea

Yun Choi ^{a,b}, Geum Hee Jeong ^{c,*}

^a Division of Tuberculosis Epidemic Investigation, Korean Centers for Diseases Prevention and Control, Cheongju, Korea

^b Graduate School of Ewha University, Seoul, Korea

^c Division of Nursing & Research Institute of Nursing Science, Hallym University, Chuncheon, Korea

ABSTRACT

Article history:

Received: July 14, 2018

Revised: September 18, 2018

Accepted: October 1, 2018

Keywords:

behavior, military personnel, prevention, Republic of Korea, tuberculosis

Objectives: The aim of this study was to gather information about Korean Army soldiers' attitude towards tuberculosis to enable the development of an informed educational program and potential intervention plans.

Methods: There were 500 male soldiers serving in the Korean Army who responded to questionnaires regarding knowledge of, attitudes towards, and preventive behavior towards tuberculosis. The questionnaires were collected between September 10 until October 1, 2014. Participants' characteristic that influenced differences in knowledge, attitudes, and preventive behavior towards tuberculosis were compared by *t* test. Variables that influenced preventive behavior were identified by multiple regression analysis.

Results: The mean scores assessing knowledge of, attitude, and preventive behavior towards tuberculosis were 11.64 (\pm 4.03) out of 20 points, 3.21 (\pm 0.38) out of 4 points, and 2.88 (\pm 0.42) out of 4 points, respectively. Non-smokers were more knowledgeable about tuberculosis than smokers. Participants who had family or friends with tuberculosis had better knowledge and a more productive attitude to tuberculosis. Participants who were educated or obtained information about tuberculosis, received better scores in all areas of knowledge, attitude and preventive behavior compared to other participants. Non-smoking, family or friends who have had tuberculosis, obtaining information about tuberculosis, and positive attitudes towards treatment and preventive education had an explanatory power of 24.6% with regard to preventive behavior against tuberculosis.

Conclusion: More relatable, systemized education should be provided regularly to improve soldiers' knowledge of, attitudes towards, and prevention against tuberculosis in the Republic of Korea Army.

<https://doi.org/10.24171/j.phrp.2018.9.5.09>
pISSN 2210-9099 eISSN 2233-6052

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Introduction

The annual incidence rates of pulmonary tuberculosis per 100,000 army soldiers in Korea were 96.4 in 2000, 89.3 in 2001, 67.6 in 2002, 60.2 in 2003, and 63.1 in 2004 [1]. Moreover, drug-resistant *Mycobacterium tuberculosis* was isolated from 18 patients (12.2%) and multidrug-resistant *M. tuberculosis* was isolated from an additional 12 patients (8.1%) out of a total of

148 soldiers who were treated for tuberculosis from 2001 to 2006 [2]. A study found 9 active infections of tuberculosis out of 464 soldiers in an army unit from December 2005 to July 2006 [3].

Out of all 34 OECD countries in 2017, Korea had the highest incidence of tuberculosis [4]. The default (lost to follow-up) rate was significantly higher in the immigrant tuberculosis positive group compared with the native tuberculosis positive

*Corresponding author: Geum Hee Jeong
Division of Nursing & Research Institute of Nursing Science, Hallym University, Chuncheon, Korea
E-mail: ghjeong@hallym.ac.kr

group (OR: 3.61) [5].

In 2014, the tuberculosis incidence rate was 68.7 per 100,000 people (34,869 cases) in the Korean population. Out of those cases, there were 2,218 patients aged 25–29 years old (70.4/100,000) and 1,998 patients aged 20–24 years old (57.9/100,000) [6]. Tuberculosis infection amongst army soldiers was reported as 270 in 2011, and 295 in 2012, giving incidence rates of 41.6 in 2011, and 45.4 in 2012, per 100,000 soldiers [7]. This was lower than the incidence rate in the general, age-matched population. However, educational intervention could further improve prevention and early detection of tuberculosis infection amongst army soldiers. In order to validate an intervention of this type, a basic study on knowledge, attitudes towards, and preventive behavior against tuberculosis is required.

This study aimed to examine correlations between the Korean Army soldiers' knowledge of, and attitudes toward tuberculosis, and factors identified that influence preventive behavior toward tuberculosis.

Materials and Methods

This study was approved by the Institutional Review Board of Hallym University (No: HRIB-2014-70). Data collection was permitted by the army unit from which the participants were drawn. Informed consent was obtained from the participants. Participants were notified that participation was voluntary and that results would be used only for research purposes. Participants' names or other forms of identifying information were not collected.

This was a descriptive cross-sectional study. The eligible participants were army soldiers from 10 army units in Gangwon-do, Korea, who attended a mandatory health education class. There were a total of 680 attendees. Questionnaires were distributed by directly visiting army troops. There was no incentive given to the soldiers for the completed survey. It was emphasized that the survey was voluntary, and 542 soldiers agreed to participate. Out of the 542 participants, 42 were excluded due to incomplete responses. Since this was a voluntary participation-based study, no researcher-side bias was present, but some subject-side bias may have been present, since 138 soldiers declined to participate and 42 soldiers gave an incomplete response to the questionnaires. However, it was not possible to control for these sources of bias in this study. There was no exclusion criteria. The minimum sample requirement to statistically power the study was 280 participants. The sample size was estimated using G^* power 3.1.7 set with an effect size of 0.25, a significance level of 0.05, and a statistical power of 0.95 [8].

In Korea, it is mandatory for most young healthy males to

be recruited to the army through the Korean Government conscription system. Therefore, the age range of the 500 participants was 18 to 25 years, with an average age of 21.01 years, and a median age of 21 years. Questionnaires were administered to army soldiers in Gangwon-do, Korea. The survey data were collected from September 10 to October 1, 2014.

To determine if preventive behavior against tuberculosis may be influenced by participants' characteristics, information about age, education, smoking, history of tuberculosis, family or friends who had tuberculosis, participation in tuberculosis education, and having obtained information about tuberculosis, were obtained. Knowledge of tuberculosis (infection route, symptoms, preventive examinations, and treatment) and attitude towards tuberculosis (recognition of tuberculosis, preventive examinations, treatment, and preventive education) were also assessed in the questionnaire.

The preliminary measurement tools were based on a revision of Cha's measurement tool [9] and the examination tool of the Korean Centers for Diseases Prevention and Control [10]. Content validity was tested by 5 specialists. Each expert checked the content validity using a 4-point Likert scale (1 = "not valid at all," 2 = "not valid," 3 = "valid," and 4 = "very valid"). In this study, the Content Validity Index of the instruments was > 80%, which was considered acceptable [11]. The preliminary tools were then administered to 10 male university students in their early 20s. They reported that the items were easy to understand and that the terminology was not challenging. The tool measuring soldiers' knowledge of tuberculosis consisted of 4 subcategories comprising a total of 20 items: 9 items on the infection route, 3 items on symptoms, 4 items on preventive examinations, and 4 items on treatment. Responses were binomial (yes, no, or do not know). The responses to 6 reverse question items were calculated as reversed scores. Cronbach's alpha value was 0.87. The tool measuring attitudes towards tuberculosis consisted of 4 subcategories with 15 items: 6 items on the recognition of tuberculosis, 3 items on preventive examinations, 4 items on treatment, and 2 items on preventive education. The tools were scored on a 4-point Likert scales (strongly disagree, disagree, agree, and strongly agree). Cronbach's alpha value was 0.83. The tool measuring preventive behavior towards tuberculosis consisted of 4 subcategories with a total of 15 items: 5 items on the infection route, 2 items on preventive examinations, 2 items on preventive education, and 6 items on healthy lifestyles. This tool was also scored on a 4-point Likert scale. Cronbach's alpha value was 0.82.

There were no quantitative variables which required a normality test or grouping. The scale of all responses to variables was binomial for participants' characteristics or 4-point Likert-scale for estimation of level of knowledge, attitudes, and

preventive behavior. The research process and presentation of data in this manuscript followed the STROBE reporting guidelines for observational studies in epidemiology [12].

Descriptive statistics were used to assess participants' general characteristics, knowledge of, attitudes towards, and preventive behavior towards tuberculosis. Differences in survey responses according to the general characteristics of the participants were compared using the *t* test. Pearson's correlation coefficient was calculated pairwise among the 3 surveys. Factors that influenced preventive behavior were identified using liner multiple regression analysis (SPSS 15.0; SPSS Inc., Chicago, IL, USA). For this, nominal scales were treated with dummy variables such as smoking, past history of tuberculosis, family or friends who have had tuberculosis, participation in education and obtaining information about tuberculosis. The Durbin–Watson value was 1.97, which indicated no autocorrelation. In addition, the tolerance of all variables ranged from 0.51 to 0.97, which was above 0.1, and the variation inflation factor (VIF) ranged from 1.02 to 1.94, which

was below the standard of 10. Therefore, it was demonstrated that there was no multi-collinearity. It showed fair homoscedasticity. To check for cases that might be influencing the regression model, Cook's distance was calculated. Out of 500 cases, there was no case which standardized residuals above 1.0, therefore fulfilling the criteria. The linearity model was significant ($p < 0.001$) after regression analysis.

Results

1. General characteristics of participants

The general characteristics of participants are presented in Table 1. A total of 379 of the 500 participants (75.8%) were enrolled in or had graduated from college. The number of smokers was 255 (51.0%). Out of these, 6 participants (1.2%) had been infected with tuberculosis.

Table 1. Characteristics of the participants (N=500).

Variable	Categories	N (%)
Age (y)	< 20	37 (7.4)
	≥ 20	463 (92.6)
Education	High school	121 (24.2)
	College	379 (75.8)
Smoking	No	245 (49.0)
	Yes	255 (51.0)
Prior history of tuberculosis	No	494 (98.8)
	Yes	6 (1.2)
Family or friends who have had tuberculosis	No	415 (83.0)
	Yes	85 (17.0)
Participation in tuberculosis education	No	374 (74.8)
	Yes	126 (25.2)
Time of tuberculosis education*	Middle or high school	79 (43.1)
	Military	71 (38.8)
	Public health center, hospital	33 (18.0)
Have obtained information about tuberculosis	No	310 (62.0)
	Yes	190 (38.0)
Sources of information about tuberculosis*	Posters, leaflets	99 (35.5)
	Public service advertisements	86 (30.8)
	Internet	56 (20.1)
	Newspapers, magazines	38 (13.6)

* Multiple responses.

2. Outcome data and main results

The participants' knowledge level was 11.64 out of a maximum score of 20 (58.2%; Table 2). The percentages of correct answers according to subcategory were 71.0% for preventive examinations, 65.0% for treatment, 55.3% for symptoms, and 50.3% for infection route.

The mean score on attitudes towards tuberculosis was 3.21 out of a maximum of 4 (Table 3). The mean scores according to subcategory were as follows: treatment, 3.48; preventive examination, 3.34; recognition of tuberculosis, 3.11; and preventive education, 2.80.

The mean score on preventive behavior towards tuberculosis was 2.88 out of a maximum score of 4 (Table 4). The mean

scores according to subcategory were as follows: healthy lifestyles, 3.04; the infection route, 2.95; preventive examinations, 2.71; and preventive education, 2.39.

3. Differences in the knowledge, attitudes, and preventive behavior according to participants' characteristics

Non-smokers' knowledge of and preventive behavior towards tuberculosis were better quality than those of smokers ($t = 2.494, p = 0.013$; $t = 4.314, p < 0.001$, respectively). Those who had family members or friends who were tuberculosis patients showed better knowledge of tuberculosis and attitudes towards tuberculosis ($t = -2.901, p = 0.004$; $t = -3.206$,

Table 2. Participants' knowledge of tuberculosis (N=500).

	Abbreviated description of items	Mean (SD)	Correct answers (%)	Rank
Infection route	Tuberculosis can break out anywhere in the human body.	0.31 (0.46)	31.4	8
	Tuberculosis can be transferred through coughing and sneezing.	0.80 (0.40)	79.6	1
	Tuberculosis may be transmitted by physical contact such as shaking hands or hugging.*	0.60 (0.49)	60.0	4
	Everyone infected with Mycobacterium tuberculosis becomes ill.*	0.60 (0.49)	60.4	3
	If infected with tuberculosis once, lifelong immunity is formed.*	0.65 (0.48)	65.2	2
	Tuberculosis is not transmitted through towels, plates, or bowls.	0.17 (0.38)	17.2	9
	Tuberculosis is more frequent in people who smoke a lot.	0.46 (0.50)	46.4	7
	Tuberculosis is inherited by children from parents.*	0.47 (0.50)	47.0	5
	Tuberculosis bacillus exists in the air.	0.47 (0.50)	46.6	6
	Subtotal	4.54 (1.74)	50.3	
Symptoms	No specific symptoms are present in the early stages of tuberculosis infection.	0.61 (0.49)	60.6	2
	If infected with tuberculosis, a slight fever occurs in the afternoon.	0.41 (0.49)	41.2	3
	If a mild fever persists, accompanied by weight loss, tuberculosis is suspected.	0.64 (0.48)	64.2	1
	Subtotal	1.66 (0.05)	55.3	
Preventive examinations	Chest X-rays are one way to diagnose tuberculosis.	0.66 (0.47)	66.0	3
	Only one vaccination with BCG can provide lifelong immunity.*	0.60 (0.49)	60.4	4
	One should be examined if a prolonged cough with sputum persists for more than 2 weeks.	0.84 (0.37)	83.6	1
	Even if no special symptoms of coughing or sputum are present, I should be examined for tuberculosis if I have weight loss, fatigue, and so on.	0.74 (0.44)	74.2	2
	Subtotal	2.84 (1.22)	71.0	
Treatment	Tuberculosis cannot be treated in the absence of overt symptom.*	0.79 (0.41)	78.8	2
	Tuberculosis is treated by taking medicine every day for at least 6 months.	0.43 (0.50)	43.4	4
	One can recover from tuberculosis if medical treatment is followed, but if not, death can result.	0.81 (0.40)	80.6	1
	Treatment is difficult, and if anti-tuberculosis drugs are not taken regularly, drug resistance can occur.	0.57 (0.51)	56.8	3
	Subtotal	2.60 (1.18)	65.0	
Total		11.64 (4.03)	58.2	

* Reverse items.

Table 3. Participants' attitudes towards tuberculosis (N=500).

Subcategory	Abbreviated description of items	Mean (SD)	Rank
Recognition of tuberculosis	I do not mind if friends or people close to me know about my tuberculosis infection.	3.24 (0.72)	3
	If I get tuberculosis diagnosis, I should immediately inform the army.	3.65 (0.51)	1
	I think that tuberculosis can be caught without even realizing it.	3.50 (0.57)	2
	I think that I may experience obstacles in my familial and professional life if I am infected with tuberculosis.	3.13 (0.81)	4
	I think that tuberculosis is a very serious disease.	3.01 (0.80)	5
	I have a higher than usual likelihood of tuberculosis infection.	2.11 (0.83)	6
	Subtotal	3.11 (0.44)	
Preventive examinations	I think that it helps to prevent tuberculosis if I get a tuberculosis medical examination regularly every year.	3.48 (0.58)	1
	I think that one should be examined for tuberculosis if there is a tuberculosis patient among one's family or friends.	3.32 (0.68)	2
	I think that it is not too difficult to get a tuberculosis checkup in the military if one has symptoms of tuberculosis.	3.21 (0.75)	3
	Subtotal	3.34 (0.50)	
Treatment	If I am diagnosed with tuberculosis, I will take an anti-tuberculosis drug steadily for at least 6 months under a doctor's direction.	3.48 (0.57)	3
	If a friend discontinues taking an anti-tuberculosis medication, I will persuade the friend to take anti-tuberculosis medication continuously.	3.39 (0.67)	4
	I will encourage tuberculosis patients around me to get treatment.	3.56 (0.54)	1
	I think that tuberculosis can be cured completely if detected and treated early.	3.49 (0.61)	2
	Subtotal	3.48 (0.48)	
Preventive education	I am interested in tuberculosis.	2.35 (0.93)	2
	I think that education about tuberculosis is needed.	3.25 (0.68)	1
	Subtotal	2.80 (0.65)	
Total		3.21 (0.38)	

Table 4. Participants' preventive behavior towards tuberculosis (N= 500).

Subcategory	Abbreviated description of items	Mean (SD)	Rank
Infection route	I try not to spend for a long time in places where air does not circulate well, such as Internet cafes, karaoke establishments etc.	2.56 (0.87)	4
	If I expectorate or spit out sputum, I wrap it in tissue paper and throw it out.	2.56 (0.87)	4
	When I sneeze or cough, I cover my mouth.	3.36 (0.67)	1
	In order to maintain fresh air indoors, I often open windows or find another way to ventilate the space.	3.23 (0.65)	2
	I cover my mouth with a handkerchief or tissue when coughing.	3.02 (0.79)	3
	Subtotal	2.95 (0.51)	
Preventive examinations	If a cough lasts more than 2 or 3 weeks, I go to the army medical corps or an army hospital to get a checkup.	3.14 (0.80)	1
	I obtain a chest X-ray regularly every year.	2.28 (0.92)	2
	Subtotal	2.71 (0.68)	
Preventive education	I frequently read materials designed to raise awareness about tuberculosis.	2.17 (0.85)	2
	I actively participate in education about tuberculosis.	2.61 (0.86)	1
	Subtotal	2.39 (0.77)	
Healthy lifestyle	If I suffer from stress, I have ways of dealing with it.	3.02 (0.79)	3
	I do not smoke for health reasons.	2.70 (1.26)	6
	I usually eat well-balanced meals to maintain good health.	3.18 (0.73)	2
	I do not eat excessively because doing so harms the immune system and overall health.	3.01 (0.82)	4
	I am sure to wash my hands after going out or exercising.	3.31 (0.62)	1
	I usually engage in regular exercise to maintain good health.	3.00 (0.77)	5
	Subtotal	3.04(0.48)	
Total		2.88 (0.42)	

$p = 0.001$, respectively). Those who had received education about tuberculosis or had obtained information about tuberculosis showed better knowledge ($t = -2.392$, $p = 0.017$; $t = -3.115$, $p = 0.002$, respectively), positive attitudes ($t = -2.628$, $p = 0.009$; $t = -2.738$, $p = 0.006$, respectively), and better quality of preventive behavior ($t = -3.447$, $p = 0.001$; $t = -5.796$, $p < 0.001$, respectively; Table 5).

4. Correlations among knowledge, attitudes, and preventive behavior

Positive correlations were found between participants' knowledge of and attitudes towards tuberculosis ($r = 0.205$, $p < 0.001$), between knowledge and preventive behavior ($r = 0.199$, $p < 0.001$), and between attitudes and preventive behavior ($r = 0.349$, $p < 0.001$).

5. Variables affecting preventive behavior

In the linear multiple regression, the 6 variables' explanatory power for preventive behavior towards tuberculosis was 24.6% ($F = 11.861$, $p < 0.001$) (Table 6). Six variables affecting participants' preventive behavior were attitude towards preventive education ($\beta = 0.249$), attitude towards treatment ($\beta = 0.192$), smoking ($\beta = -0.184$), having obtained information about tuberculosis ($\beta = 0.159$), knowledge of preventive

examination ($\beta = 0.103$), and having family or friends who were tuberculosis patients ($\beta = -0.099$). The better quality of preventive behavior were shown in participants who had positive attitude towards preventive education and treatment, those who did not smoke, had obtained information about tuberculosis, had better knowledge of preventive examination, and those who had family or friends who were tuberculosis patients.

Discussion

The average scores on the questionnaires were as follows: knowledge of tuberculosis, 11.64 (± 4.03) out of 20 points; attitudes, 3.21 (± 0.38) out of 4 points; and preventive behavior, 2.88 (± 0.42) out of 4 points. Non-smokers were more knowledgeable about tuberculosis and showed better preventive behavior than smokers. The presence of tuberculosis patients among the family members and friends of participants was associated with a higher level of knowledge about tuberculosis and more productive attitudes towards tuberculosis. Soldiers who had received education on tuberculosis had a more positive response on all 3 questionnaires. Non-smoking, obtaining information, knowledge of preventive examination, and attitude toward

Table 5. Differences in knowledge, attitudes, and preventive behavior according to participants' characteristics (N=500).

Variables	Categories	Knowledge		Attitudes		Preventive behavior	
		Mean (SD)	<i>t</i> (p)	Mean (SD)	<i>t</i> (p)	Mean (SD)	<i>t</i> (p)
Age (y)	< 20	10.95 (3.87)	-1.092 (0.275)	3.28 (0.39)	1.079 (0.301)	2.91 (0.41)	0.481 (0.631)
	≥ 20	11.70 (4.04)		3.21 (0.38)		2.87 (0.42)	
Education	High school	11.14 (4.20)	-1.575 (0.116)	3.25 (0.43)	1.256 (0.210)	2.86 (0.49)	-0.478 (0.633)
	College	11.80 (3.96)		3.20 (0.36)		2.88 (0.40)	
Smoking	No	12.10 (3.92)	2.494 (0.013)	3.19 (0.35)	-1.351 (0.177)	2.96 (0.35)	4.314 (<0.001)
	Yes	11.20 (4.09)		3.23 (0.41)		2.80 (0.46)	
Prior history of tuberculosis	No	11.64 (4.02)	-0.015 (0.988)	3.21 (0.38)	0.500 (0.617)	2.87 (0.42)	-0.660 (0.510)
	Yes	11.67 (4.89)		3.13 (0.27)		2.99 (0.29)	
Family or friends who have had tuberculosis	No	11.41 (4.16)	-2.901 (0.004)	3.19 (0.37)	-3.206 (0.001)	2.88 (0.42)	0.299 (0.765)
	Yes	12.79 (3.11)		3.33 (0.39)		2.86 (0.45)	
Participation in tuberculosis education	No	11.39 (4.06)	-2.392 (0.017)	3.18 (0.37)	-2.628 (0.009)	2.84 (0.42)	-3.447 (0.001)
	Yes	12.38 (3.86)		3.29 (0.40)		2.99 (0.41)	
Have obtained information about tuberculosis	No	11.21 (4.21)	-3.115 (0.002)	3.17 (0.38)	-2.738 (0.006)	2.79 (0.41)	-5.796 (<0.001)
	Yes	12.35 (3.61)		3.27 (0.37)		3.01 (0.40)	

Table 6. Variables influencing preventive behavior towards tuberculosis (N=500).

Variables	B*	SE	β	t	p
(Constant)	1.612	0.200		8.063	< 0.001
Age (y)	0.004	0.005	0.032	0.801	0.423
Education	-0.035	0.040	-0.035	-0.876	0.382
Smoking†	-0.155	0.034	-0.184	-4.532	< 0.001
Past history of tuberculosis†	0.115	0.152	0.030	0.755	0.451
Family or friends who have had tuberculosis †	-0.111	0.046	-0.099	-2.412	0.016
Participation in tuberculosis education†	0.029	0.042	0.030	0.697	0.486
Have obtained information about tuberculosis†	0.138	0.038	0.159	3.646	< 0.001
Knowledge					
Infection route	0.002	0.011	0.006	0.136	0.892
Symptoms	0.006	0.019	0.015	0.317	0.751
Preventive examinations	0.036	0.018	0.103	2.025	0.043
Treatment	-0.006	0.018	-0.018	-0.358	0.720
Attitude					
Recognition of tuberculosis	-0.040	0.046	-0.042	-0.865	0.388
Preventive examinations	0.075	0.044	0.090	1.702	0.089
Treatment	0.170	0.048	0.192	3.544	< 0.001
Preventive education	0.161	0.028	0.249	5.728	< 0.001
R ² = 0.269 Adjusted R ² = 0.246 F = 11.861 p < 0.001					

*Unstandardized coefficients.

†Dummy coding.

preventive education and treatment showed positive correlation with preventive behavior towards tuberculosis (Table 6).

The results from this study provide evidence for several recommendations for tuberculosis education in the Korean Army. The percentage of correct answers in the questionnaire measuring knowledge of tuberculosis was 58.2%. Knowledge levels were especially low regarding the infection route, symptoms, and treatment (Table 2). Therefore, accurate information about these topics should be provided more proactively. Regarding soldiers' attitudes towards tuberculosis, low scores were observed for items assessing the possibility of being infected with tuberculosis and the seriousness of the disease (Table 3). The period of military service occurs during

the age interval at which soldiers are likely to be the healthiest, and therefore, they may have low levels of concern about health and disease. Soldiers should receive more detailed training and education about tuberculosis in particular, and diseases in general.

In measuring preventive behavior, more positive responses were observed in the participants who recorded a healthy lifestyle compared with other categories. Soldiers reported healthy habits regarding exercise, meals, handwashing, and stress control, due to the regular hours experienced in the daily routines in military service. However, the prevalence of non-smoking was low (Table 4). Soldiers were not aware of the importance of non-smoking for the prevention of tuberculosis. The smoking rate of the participants was 51.0%,

meaning that non-smokers may have been exposed to passive smoking. Soldiers should receive further education on the negative effects of smoking on health, and education programs for preventing and stopping smoking, and prevention of tuberculosis infection, should be implemented simultaneously.

Behavior towards preventive education showed the lowest score based on the response to the questionnaire, "I frequently read materials designed to raise awareness about tuberculosis and I actively participate in education about tuberculosis." The reasons for this low score may result from the lack of incentive for these young soldiers to learn about tuberculosis prevention. Therefore, more interesting or dynamic educational materials should be designed to make the education more stimulating in this age group, for example, with the use of interactive computer games or cartoons.

Participants who were educated or had obtained information about tuberculosis had a better knowledge of, attitudes towards, and preventive behavior towards tuberculosis (Table 5). Of the participants, 74.8% had not been educated about tuberculosis and 62.0% had not obtained information about tuberculosis. Education on tuberculosis in the army had not been regularly provided, but was available only occasionally. These groups should be targeted for education and the dissemination of information. The health of soldiers is important not only during military service, but also after discharge from military service. Since military service is still mandatory for Korean males, the Government should invest in the care of their health. Regularly scheduled education on tuberculosis should be included during boot camp training and during military service. Additionally, education via mass media, such as military television or radio (the Korean Forces Network®) is an effective and convenient method of raising awareness [13].

Smoking, the presence of tuberculosis patients among family members and friends of the participants, having obtained information about tuberculosis, knowledge about preventive examinations, and attitudes towards treatment and preventive education accounted for 24.6% of preventive behavior towards tuberculosis (Table 6). Of those explanatory factors, attitudes towards treatment and preventive behavior and smoking showed the greatest explanatory power, meaning that those factors should be emphasized in the design of educational programs.

No studies have explored these questions, either in Korea or elsewhere. In Korea, a previous study of the parents of North Korean refugee children found a significant positive correlation between awareness and preventive behavior, and between preventive behavior and interest in health [14]. In India, knowledge about tuberculosis was shown to facilitate preventive behavior, helping to prevent the transmission of tuberculosis in the community, as well as being associated

with policy development and education [15]. Villagers in India with a greater knowledge of, positive attitudes towards, and improved preventive behavior towards tuberculosis, were found to practice better health prevention actions [16]. A lack of knowledge, negative attitudes towards tuberculosis patients, and social exclusion of the patients were more prominent from pastoralists than from their neighboring farmers in Ethiopia [17].

This study had some limitations. Firstly, the participants were not a representative sample of army soldiers in Korea. The participants were drawn from 10 arbitrarily selected army units in Gangwon-do; however, it may be representative of all Korean Army soldiers because soldiers were randomly allocated from all areas of Korea. Secondly, 180 of a total of 680 soldiers (26.5%) did not submit responses that were ultimately not included in the study. However, the final sample size was large enough that this omission did not affect the overall validity of the study; nonetheless, it is a potential limitation that should be considered.

In general, despite the limitations, the results in this current study provided information for the development and implementation of a tuberculosis prevention program in the Korean Army.

In conclusion, the major factors influencing preventive behavior towards tuberculosis were found to be non-smoking and being informed about tuberculosis. A higher level of knowledge about preventive examinations was associated with engaging in preventive behavior more routinely. In order to improve army soldiers' knowledge of, attitudes toward, and preventive behavior towards tuberculosis, more systemized and relatable education about tuberculosis should be delivered via the mass media on a regular basis.

1. Data Statement

Supplement 1. Collecting data from survey on tuberculosis prevention from army soldiers in 10 army units, Korea from September 10 to October 1, 2014.

Conflicts of Interest

The author has no conflicts of interest to declare.

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