《Original Article》

Comparison between homeless and non-homeless people at Nagoya about the prevalence of active and inactive pulmonary tuberculosis according to chest x-ray findings

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Summary

1, The prevalence of active and inactive pulmonary tuberculosis (TB) in the homeless people in a shelter during winter (1996-1999) in Nagoya was 28-57 % in 50-59, 60-69 and 70-79 age groups. The prevalence of active pulmonary TB in the homeless people was 9.8 %.
2, The prevalence of active and inactive pulmonary TB in non homeless males was around 30 % in Nakamura ward in 40-49, 50-59, 60-69, and 70-79 age groups, and 30 % in Tenpaku ward in 70-79 age group in 1996. The incidence of registered TB patients was higher in Nakamura ward than in Tenpaku ward. The incidence in Nakamura ward was two times higher than in Tenpaku ward.
3, The prevalence of active and inactive pulmonary TB in non-homeless females in 70-79 age group was 26 % in Nakamura ward and 17 % in Tenpaku ward in 1996.
4, TB lesions on the lung manifested in only 30 % of cases shown on a chest x-ray examination, even if all people were infected by TB bacillus.
5, We can estimate the degree of TB infiltration in the groups by analyzing the prevalence of active and inactive TB lesions on a chest x-ray film.

Key words: prevalence of pulmonary tuberculosis, homeless, chest x-ray finding

Introduction

In general, in order to know if a person was infected with tuberculosis (TB) a tuberculin reaction test is used. In the field of public health, this test is often used to discover the prevalent infectious rate of people in different groups. However, it is often not possible to know of a TB infection by using the tuberculin test because of the influence of a BCG vaccination.

Conversely, a chest x-ray examination is often used to know whether an individual have an active TB lesion or not in their lung. Besides active TB lesions, there are many TB lesions which show a TB infection from the past. By analyzing these TB lesions on the chest x-ray film, we may estimate the degree of TB infiltration in different groups. We would like to report the possibility of such an estimate.

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Methods

1, Cases

1) The people who had a chest x-ray examination over the Christmas and New Year period in 1995-1999 at a shelter for homeless people in Nagoya.

2) The people who had a chest x-ray examination in 1996 as part of a general screening program for residents (i.e. non-homeless) in Nakamura-ward of Nagoya

Nakamura-ward was the area where the incidence and prevalence of registered TB patients were the highest out of the 16 wards in Nagoya.

3) The people who had a chest x-ray examination in 1996 as part of a general screening program for residents (i.e.non-homeless) in Tenpaku-ward of Nagoya.

Tenpaku-ward was the area where the incidence and prevalence of registered TB patients were the lowest out of the 16 wards in Nagoya city.

2, Chest x-ray examination

A mobile mass fluoro-radiography (indirect radiography) was used for the examination. The condition of radiographic-imaging was that the x-ray was radiated from posterior to anterior, and there was a distance of 100 cm distance from x-ray tube to the film.

3, Diagnosis

Two doctors, authors with extensive experience in diagnosing TB patients using chest x-ray films, read the homeless people's film, and one doctor, one of authors read the non homeless people's film.

Result

1, homeless people at a shelter

The number of the people who had the chest x-ray examination was 97 in1995,118 in 1997, 100 in 1998 and 152 in 1999. Finally, 454 males were selected as subjects to analyze after removing 118 people who took the examination twice or more in 1995-1999, and one female. The number (the prevalence) of active and inactive cases of TB was 156 (35.0 %).

The higher the age group was, the higher the prevalence of TB was. However the rate in the age group 70-79 years decreased as shown in Table 1.

Diagnostic standard of TB was adopted the roentgenological classification of pulmonary TB. [the Gakkai classification (GC)]. The active cases (GC: I, II, III, IV) were 43 which was 27.6 % out of 156 TB cases as shown in Table 1. The prevalence of active TB cases was 9.4 % in 453 persons. The healed cases (GC: V including pleurisy and pleural adhesion) was 113 which was 73.4 % out of 156 TB cases. The percentage of pleurisy or pleural adhesion cases was 30 % of the inactive cases.

2, non-homeless people in Nakamura-ward

The number of people who had a chest x-ray examination in accordance with the TB control law was 1,354 males (111 in 30-39 age group, 155 in 40-49 age group, 261 in 50-59 age group, 110 in 60-69 age group and 274 in 70-79 age group) and 3,304 females (240 in 30-39 age group, 608 in 40-49 age group, 977 in 50-59 age group, 1126 in 60-69 age group, and 353 in 70-79 age group) in 1996 in Nakamura ward. The number of cases with active or inactive TB was 246 (18.2 %) for males and 338 (10.2 %) for females. The prevalence of active and inactive pulmonary TB cases according to gender and to the age group was shown in Table 2 and 3.

The prevalence of TB cases increased according to age for both genders. Around 30 % in the prevalence of TB was recognized in males of 60-69 and 70-79 age groups, and around 25 % in females in 70-79 age group.

3, non-homeless people in Tenpaku-ward

The number of people who had a chest x-ray examination in accordance with the TB control law was 753 males (100 in 30-39 age group, 122

Table 1. Cases of tuberculosis (TB) according to chest x-ray film of the homeless people by Gakken classification

Age group	Total examine	TB cases	%	Active I	II	III	IV	Inactive V
20-39	31	4	12.9				1	3
40-49	111	25	23.4		3	4	2	16
50-59	194	67	34.5		4	8	7	48
60-69	110	58	57.6			4	10	44
70-79	7	2	28.0					2
	453	156	100.0		7	16	20	113

Gakken classification
I : Active tuberculosis with large cavity
II : Active tuberculosis with other cavity except I
III : Active tuberculosis without cavity
IV : Stationary tuberculosis
V : Inactive tuberculosis (adhesion of calcification)

Table 2. Prevalence (%) of active and inactive pulmonary tuberculosis (TB) of homeless males, non-homeless males in Nakamura and Tenpaku ward diagnosed by chest x-ray film

Age group	Prevalence (%) of active and inactive TB		
	Homeless	Nakamura	Tenpaku
	n=453	n=1354	n=753
30-39	12.9	1.8	2.0
40-49	23.4	2.6	7.4
50-59	34.5	10.3	6.4
60-69	57.6	30.0	21.8
70-79	28.0	31.4	29.5
	34.8	18.2	15.7

Table 3. Prevalence (%) of active and inactive pulmonary tuberculosis (TB) of non-homeless females in Nakamura ward and Tenpaku ward diagnosed by chest x-ray film

Age group	Prevalence (%) of active and inactive TB	
	Nakamura ward	Tenpaku ward
	N=3304	N=2708
30-39	2.1	1.7
40-49	3.6	3.0
50-59	6.7	6.2
60-69	13.6	9.6
70-79	26.3	16.9
	10.2	6.2

in 40-49 age group, 116 in 50-59 age group, 293 in 60-69 age group and 122 in 70-79 age group) and 2,708 females (408 in 30-39 age group, 643 in 40-49 age group, 825 in 50-59 age group, 684 in 60-69 age group and 148 in 70-79 age group) in 1996 in Tenpaku ward. The number of cases with active or inactive TB was 118 (15.7 %) for males and 168 (16.9 %) for females. The prevalence of active and inactive pulmonary TB cases according to gender and to age groups are shown in Table 2 and 3. The prevalence of TB cases increased according to aging in both gender. Around 30 % in the prevalence of TB was recognized in 70-79 age group of males only, and around 17 % was recognized in 70-79 age group of females.

4, Comparison between homeless males, non-homeless males in Nakamura and Tenpaku

There was a 10-20 % difference in active and inactive TB prevalence between the homeless males and the non-homeless males in 30-39 and 40-49 age groups as shown in Table 2. TB prevalence in homeless males was 3-7 times higher than TB prevalence in non-homeless males in 30-39 and 40-49 age groups. Over 60 years old, TB prevalence for homeless males became about equal to that for non-homeless males, because TB prevalence of non-homeless males had increased.

5, Comparison between non-homeless people in Nakamura and Tenpaku ward

In males, the pulmonary TB prevalence was

higher in Nakamura ward than in Tenpaku ward. These differences were recognized in males in 50-59 and 60-69 age groups. The prevalence was 4-8 % higher in Nakamura ward than in Tenpaku ward.

For females, there was no difference in pulmonary TB prevalence in 30-39, 40-49 and 50-59 age groups, however, the pulmonary TB prevalence in Nakamura ward was 5 % in 60-69 age group, and 10 % in 70-79 age group, higher than in Tenpaku ward.

Discussion

The Japanese TB Prevalence Survey 1953 [1] reported that the prevalence of active and inactive TB cases in 30-39, 40-49, 50-59, 60-69 and 70-79 age groups was around 30 % for males. The same Survey in 1967 [2] reported that the prevalence of active and inactive TB cases was around 30 % for males in 40-49, 50-59, 60-69 and 70-79 age groups. The prevalence of active and inactive TB decreased only in the male 30-39 age group from 1953 to 1967. Decreasing of prevalence was 15 %. The prevalence of pulmonary TB for females was 24-29 % in 40-49, 50-59, 60-69 and 70-79 age groups in 1953 and 1968 as shown in Table 4 and 5. Decreasing was not recognized in females

Otherwise, the prevalence of active and inactive pulmonary TB cases in homeless people was around 30 % in the 40-49, 50-59, 60-69 and 70-79 age groups in 1995-1999. The prevalence of TB in homeless people at present was similar to the Japanese males in 1953-1967 in 40 years ago.

The prevalence (9.8 %) of active TB in homeless people in this study was slightly higher than that of the homeless in other studies: 1.9-3.2 % in Nakamura ward of Nagoya [3], 1.9-2.5 % in Nagoya of those registered as homeless[4], 3.0-6.9 % in Nagoya[5], 6.0 % in Osaka[6], 5.2-7.9 % in Osaka[7], 6 % in the USA[8,9] and 0.9 % in England[10], and 1.5 % in London[11]. The prevalence of active and inactive TB in chest-x-ray examinations for the homeless people was reported to be 26.8 % and 30 % in Osaka[6,7]. The prevalence of active and inactive TB in this study was equal to or slightly higher than these values (26.8 % nad 30 %).

Table 4. Prevalence (%) of active and inactive pulmonary tuberculosis (TB) of Japanese males in 1953 and 1968 diagnosed by chest x-ray film

Age group	1953		1968	
	active and inactive	active	active and inactive	active
30-39	28.5	(13.0)	14.4	(2.9)
40-49	29.2	(13.4)	28.8	(7.1)
50-59	30.4	(12.8)	32.7	(8.9)
60-69	32.8	(14.6)	33.3	(9.6)
70-79	34.9	(15.2)	34.3	(10.0)

Table 5. Prevalence of active and inactive pulmonary tuberculosis (TB) of Japanese females in 1953 and 1968 diagnosed by chest x-ray film

Age group	1953		1968	
	active and inactive	active	active and inactive	active
30-39	13.0	(7.6)	13.1	(2.1)
40-49	23.6	(7.8)	20.5	(3.2)
50-59	25.4	(6.9)	24.2	(3.2)
60-69	27.2	(7.0)	26.9	(3.8)
70-79	28.9	(9.0)	23.9	(3.7)

The incidence (per 100.000) of registered active TB patients in Nakamura ward was 82.7 in 1995, and 77.5 in 1996, and the prevalence in Tenpaku ward was 27.7 in 1995 and 34.8 in 1996.

The incidence of registered active TB patients in Nakamura ward was twice as high than it was in Tenpaku ward. Nakamura ward can be defined as the high incidence district and Tenpaku ward defined as the low incidence district in Nagoya.

The chest x-ray examination showed that the prevalence of active and inactive pulmonary TB in males of Nakamura ward was 30 % in 60-69 and 70-79 age groups, 2-3 % in 30-39 and 40-49 age groups. However, only 30 % was recognized in 70-79 age group in Tenpaku ward. This means a 10 years time difference between them. The prevalence of active and inactive pulmonary TB of females in Nakamura ward was 26 % in the 70-79 age group. However, it was under 17 % in all age groups in Tenpaku ward. This also means a 10 years time difference between two wards.

Almost all Japanese people were thought to be infected by the TB bacillus 50 years ago, between 1953-1967. However, we were only able to identify 30 % people with active and inactive TB lesions.

When we don't know the incidence of registered TB patients, or the positive rate of the Tuberculin test, we can estimate the degree of the TB infiltration in the group by analyzing the prevalence of active and inactive TB lesions on the chest x-ray film.

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和文抄録

名古屋市住所不定者と非住所不定者における胸部レントゲン所見からの肺結核有所見率の比較研究

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1、名古屋市冬季越年施設の住所不定者の肺結核有所見率（活動性および治癒型）は30％であった。その内活動性肺結核有病率は9.8％であった。
2、名古屋市非住所不定者の男性の肺結核有所見率は、中村区では60-69、70-79歳の年齢階級で30％であり、天白区では70-79歳の年齢階級で30％であった。結核患者の登録罹患率は中村区が天白区より高率であり、中村区は天白区の約２倍であった。
3、名古屋市非住所不定者の女性の肺結核有所見率は、中村区では70-79歳で26％であり、天白区では70-79歳で17％であった。
4、すべての住民が結核菌に感染していたとしても、胸部間接レントゲン写真上で確認できる結核病巣は30％であった。
5、地域における胸部間接レントゲン写真上の年齢階級別の感染性および治癒型肺結核有所見率を分析することにより、地域の結核蔓延状況を推測できる。

キーワード：肺結核有所見率、住所不定者、胸部レントゲン写真

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