

The Incidence of Tuberculosis in Senior Centers in Taipei City, 2004-2006

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From Chinese version, pp,696-706

Abstract

During 2004-2006, we investigated all reported tuberculosis (TB) cases from senior centers in Taipei City to choose the confirmed TB cases as our target cases. All related information was collected by self-drafted semi-structured questionnaires. The data were entered, confirmed and defaulted by EPI-INFO 3.3 edition and were subsequently analyzed for incidence and percentage of tuberculosis under based on the cases' personal background and demographic characteristics.

295 cases were reported from senior centers in Taipei City during 2004-2006, of which 212 cases were confirmed as TB cases. The annual TB incidence from the senior centers was 0.81% (810 cases/100 thousand people), which was 15.5 times higher than that of Taipei City (52.11 cases/100 thousand people) during the same time frame. Among these target cases, 26 cases (12.26%) had TB history.

The annual TB incidence from senior centers was 15.5 times the average rate

Received: March 26, 2008; Accepted: June 30, 2008.

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in Taipei City and 3.7 times the overall rate for people older than 65 years old. This situation manifests the importance and urgency of TB prophylaxis and treatment in this population. 81 cases (38.2%) with no clinical signs were diagnosed as TB cases during the regular examinations or examinations for people who have had contact with TB patients. Thus, the senior centers should conduct regular and vigorous chest radiology examinations on their residents. In order to detect the recurrence of TB cases, regular follow-up examinations should also be administered for cured patients or patients with treatment cessation.

Keyword: tuberculosis, geriatric residential institution, default, success, relapse, reinfection

Introduction

Tuberculosis had been removed from the top ten list of leading causes for death since 1995 through decades of effective prevention and treatment in Taiwan. However, we are facing the challenge of tuberculosis again in Taipei City and in the whole of Taiwan due to change in society and acceleration in the aging of population; in addition, tourism development, import of foreign laborers, increasing numbers of foreign spouse, increasing international business and increasing numbers of AIDS and TB co-infection. 22,362 cases were reported in 2003, of which 15,042 cases were confirmed as new patients, and the incidence was 66.67 cases per 100 thousand people [1]. 1,336 of the newly confirmed cases (8.88%) were recorded in Taipei City, which was the second largest number of new TB cases among all cities/ counties in Taiwan. The incidence (per 100 thousand people) of TB in Taipei City in 2003 was 50.71 cases, which was 9.94 times higher than USA (5.1 cases) and 2.05 times higher than Japan (24.8 cases). It is very important to decrease the TB incidence in Taipei City.

Taipei City is a metropolis with a severely aging population in Taiwan. The population in Taipei City in 2005 was 2,616,375 and the senior population (>65 years old) was 295,301 (11.29% of total population), which had exceeded the benchmark for an aged society (7%) established by World Health Organization (WHO). Many cases of chronic diseases were attributed to the aging population. The TB incidence in patients with chronic diseases (including diabetes mellitus, chronic hepatic diseases, pneumoconiosis and neoplastic diseases) was higher than general population. The clinical signs of this disease from the patients with decreased immunity were atypical, which might lead to delayed diagnoses and guarded and poor prognoses, thus losing the best opportunity for prevention and treatment.

Because of the transition of the society, many senior people with chronic diseases or without care takers were sent to senior centers, which hosted senior people who either paid for their own expenses or had no family members to look after them. There were 182 registered senior centers in Taipei City (till December, 2006). Tuberculosis is an air-borne disease and cluster infections of TB may occur through direct or indirect contact with an active TB patient in the center. This is a very severe problem for these senior centers [2]. An ideal circumstance for TB transmission may be established in these senior centers because of the decreasing immunity of the elderly, malnutrition, the closed environment and repeated contact. The percentage of senior people was only 12% in the US population in 1987, and 27% of the new TB patients were recorded in the group aged 65 years old or above. The TB incidence of the residents in the senior centers was 39.2 cases per 100 thousand people in 1984-1985, which was higher than the incidence rate among senior people in the community (21.5 cases per 100 thousand people) [3].

The cluster infections in the senior centers were occasionally reported in Taiwan. In 2006, several events occurred. A suspected cluster infection of TB with 6 reported cases occurred in a special education center in Taipei City. Other events took place in senior centers in Changhua County in April and in Tainan County in June with 5 and 6 reported cases, respectively. Similar events also occurred in other countries [4]. A patient in a senior center in Askansas, USA, died from TB due to the lack of a prompt diagnosis, and this disease was transmitted to another senior center, a local hospital and the wider community [5]. The TB incidence in the senior centers in USA was 39.2 cases per 100 thousand people, which was almost 4 times higher than in the general population [6]. Thus, the prevention and treatment of TB in the senior centers should not be neglected.

In 1953, the incidence of new TB cases in the 65 and above age group was 13.8% and had increased to 28.6% by 1979, while the percentage of elderly people (65 years old and above) had increased from 8.7% to 11.2% [7]. The difficulty and delay in diagnosis might have resulted from decreased general health status and social mentality, long-term chronic diseases, atypical clinical signs and carelessness of the care takers. Thus, TB should still be suspected while no typical radiological signs were noted in senior patients [8].

According to a health status survey of senior people conducted by the Directorate General of Budget, Accounting and Statistics, 56% of the senior people had decreased health status and among them, 1 out of ten could not manage life independently and needed long-term care service. 10% of those patients who needed long-term care service would be sent to senior centers [9]. The crowded environment may accelerate the transmission of infectious droplets. Thus, it is an urgent demand to establish the prevention and treatment system for TB and other infectious diseases. A report revealed that 30% of the family

members in close contact with TB patients may be infected and the incidence of reactivation of TB bacteria was 5-10%. Around 50% of the infected family members may fall ill in the first 5 years after infection and the highest risk lies in the first year [10]. A research targeted a senior centers in Arkansas, USA, revealed that 12% of the 12,196 newly arrived patients were negative in TB examination. 5% of these negative patients will become positive in TB tests if there are confirmed tuberculosis patients in the center, while 3.5% negative patients will become positive in centers without any confirmed TB patient [11]. It is necessary to investigate the TB incidence in the senior centers in Taipei City to prevent cluster infections in the centers with confirmed active TB patients.

Material and methods

Targeted patients

The targeted patients were selected from the TB cases reported by the senior centers in Taipei City, 2004-2006. Every reported case was investigated and the confirmed patients were selected as targeted cases by a case manager.

Timeframe of the investigation

From January 1, 2004, to December 31, 2006.

Questionnaire

We used a self-drafted questionnaire for collecting demographic data, situation of illness, past disease history and risk factors.

Data management and analysis

The collected data were entered, confirmed and defaulted by EPI-INFO 3.3 edition. The difference of each case was analyzed by demographic characteristics, and the frequency, percentage and odds ratio of the morbidity were analyzed by analogue analysis and background of each case. The counted residents of the

senior centers were those who still stayed in the centers in the end of each year, and most of them were 65 years old or above. The counted cases from nursing homes, psychiatric institutions and respiratory disease care centers were those of registered patients (the average registration rate was 70-80%), and no age limitation was placed.

The standard of reported tuberculosis case (based on the Guidelines for Prevention and Treatment of Tuberculosis, Taiwan CDC)

1. The patients with positive bacteriologic examination and other confirmed patients.
2. The patients with positive bacteriologic examination who have passed away without confirmation and medical treatment.
3. All tuberculosis patients receiving anti-TB treatment
4. All cases with positive results in acid-fast stain and bacterial culture should be reported by the laboratories

The definition of confirmed TB patient

1. Laboratory diagnosis standards:
 - A. TB positive in bacterial culture from collected samples (sputum, plural fluid or biopsy specimen);
 - B. Acid-fast stain positive in smear examination from collected samples (sputum, plural fluid or biopsy specimen);
 - C. Typical lesions found in pathological examination.
2. Clinical diagnosis standards: long-term cough, decreased body weight and fever with suspected TB lesions under radiology. After anti-TB drug administered:
 - A. Suspected lesions improved under radiology or
 - B. Improved clinical signs

3. The confirmed cases were defined by fitting with the diagnostic standards listed above.

The definition of re-opened TB cases

The patients with past TB history and completed medical treatment who have been reported again.

Result

During 2004-2006 in Taipei City, the residents in the senior centers (including registered senior centers, psychiatric institutions, nursing homes and respiratory disease care centers) were 7,308, 7,784 and 7,888, respectively. The qualified reported TB cases each year were 94, 82 and 119, respectively (totally 295 cases). The proportion of male to female was 197:98. The age distribution lied between 19 to 94 years old. 18 cases were between 65-69 years old (6.1%), while 80 cases (27.1%) and 161 cases (54.6%) were between 70-79 and 80 (or above) years old, respectively. 223 (75.6%) of these cases resided in the senior centers, while 19 cases (6.4%) in the nursing homes, 8 cases (2.7%) in the psychiatric institutions and 45 cases (15.3%) in the respiratory disease care centers.

212 cases were confirmed as tuberculosis patients by re-examination in the 295 reported cases. 69 cases were recorded in 2004 (12 re-opened cases and 57 new cases) and the annual incidence was 0.78% (57/7,308); 63 cases were recorded in 2005 (7 re-opened cases and 56 new cases) and the annual incidence was 0.72% (56/7,784); 80 cases were recorded in 2006 (7 re-opened cases and 73 new cases) and the annual incidence was 0.93% (73/7,888). The average annual incidence of these 3 years in these care centers was 0.81% (810/100,000) and was 15.5 times of the average rate in Taipei City (52.11/100,000; 54.67/100,000 in

2004, 52.91/100,000 in 2005 and 48.74/100,000 in 2006) and 3.7 times of the rate for senior people 65 years old or above (220/100,000; 697/286,474 in 2004, 699/295,301 in 2005 and 577/306,433 in 2006). The ratio of male to female patients was 142: 70. The age range lied between 19 to 94 years old with the average being 78 years old. In all patients, 25 cases (11.80%) were 64 years old or under, 11 cases (5.19%) were 65-69 years old, 55 cases (25.94%) were 70-79 years old, and 121 cases (57.07%) were 80 years old or above. As to the place of residence, 168 cases resided in the senior centers (79.2%), 15 cases in the nursing homes (7.1%), 5 cases in the psychiatric institutions (2.4%) and 24 cases in the respiratory disease care centers (11.3%). 131 confirmed cases demonstrated clinical signs. 28 cases (13.2%, 28/131) revealed 2 or more clinical signs, including fever and cough (11 cases) or cough and expectoration (14 cases). 61 cases revealed clinical signs and were hospitalized (28.8%). Fever (41cases, 19.3%), cough (28cases, 13.2%), expectoration (19 cases, 9.0%) and other (12 cases, 5.7%) were the most common clinical signs in the cases with a single sign. 81 cases (38.2%) were confirmed as TB patients during regular examination (Table 1.).

Table 1. The clinical signs of the confirmed TB patients in the senior centers (N=212)

Clinical signs	Number	Percentage%
N/A(regular examination)	81	38.2
Hospitalized with clinical signs	61	28.8
Fever	41	19.3
Cough	28	13.2
Expectoration	19	9.0
Other	12	5.7
Weariness	5	2.4
Anorexia	5	2.4
Decreased body weight	3	1.4
Hemoptysis	2	0.9
Fever in the afternoon	2	0.9

Night sweat	1	0.5
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199 confirmed TB patients (93.9%) had taken chest radiology; 7 were normal in the examination, 165 had abnormal chest radiogram, 17 had extrapulmonary tuberculosis, and 10 had abnormal radiogram associated with extrapulmonary tuberculosis. 211 patients (99.5%) accepted sputum smear examination and 118 patients (55.9%) were positive in this examination. 174 patients (82.1%) accepted sputum bacterial culture and 114 patients (65.5%) were positive. The diagnosis of tuberculosis from these patients was based on bacteriology examinations (152 cases, 71.7%), pathological examination (6 cases, 2.8%), physical examinations (53 cases, 25%) and other (1 case, 0.5%).

As to the medical treatment, 4 patients did not receive any medical treatment, 40 patients are still in the treatment schedule and 75 patients had completed the treatment. 95 patients passed away, 15 of which died due to tuberculosis and 80 patients died due to non-TB causes. 187 patients (88.2%) accepted the “Directly Observed Treatment, Short Course” (DOTS program) and 25 patients (11.8%) did not accept this program. Only 2 patients had multiple-drug resistance in these 212 cases and both of them did not have TB history.

In the aspect of potential diseases, except other diseases (including 74 cases of benign tumor, leukemia, head trauma, Alzheimer’s disease, schizophrenia and Down syndrome, 34.9%) and unknown disease history (39 cases, 18.4%), hypertension (48 cases, 22.6%), diabetes (33 cases, 15.6%), apoplexy (15 cases, 7.1%), asthma (11 cases, 5.2%) and other respiratory diseases (11 cases, 5.2%) topped the list. These were followed by heart diseases (9 cases, 4.2%), renal diseases (5 cases, 2.4%) and malignant tumor (4 cases, 1.9%). 4 patients (1.9%) had no clinical disease and 50 patients (23.6%) had 2 or more diseases. Only 5

patients (2.4%) had accepted BCG vaccine, while other 207 patients (97.6%) did not.

26 patients (12.3%) had TB history (12 cases in 2004, 7 cases in 2005 and 7 cases in 2006). 7 of which (26.9%) had received medical treatment, 14 patients (53.9%) had completed the treatment schedule and 5 patients (19.2) had no or unknown treatment history.

Discussion

In our study, the average TB incidence in the senior centers in Taipei City during these 3 years was 810 cases per 100 thousand people, which was 15.5 times of the average incidence in Taipei City (52.11 cases per 100 thousand people) and 3.7 times of the average incidence in the population of 65 years old or above (220 cases per 100 thousand people). 187 patients (88.2%) were 65 years old or above, which indicated that the TB incidence might increase with aging. Tuberculosis is still a major health problem in the senior centers and only close monitoring and restrict prevention might help decrease the TB incidence in these centers [12].

There were 26 patients (12.3%) who had TB history in the senior centers, which indicated that 1 out 8 cases was an old TB case. The risk of TB transmission in the senior centers was higher because of the crowded environment and close contact [13]. Thus, regular follow-up examinations for the patients who had completed or interrupted treatment should be scheduled to prevent the recurrence of tuberculosis. There were only 5 patients (2.4%) who had received BCG vaccine, while 207 patients (97.6%) did not. In Taiwan, the BCG vaccine was introduced in 1947 and had been extensively popularized since 1951. The people who were born before 1947 might not have received BCG vaccination. It

may be useful to conduct tuberculin tests for the senior people in these centers to increase the diagnostic evidence.

In this research, 81 patients (38.2%) were found TB positive during regular examination. Thus, regular chest radiology examination is highly recommended for the senior people in these centers. The patients with abnormal chest radiology should receive re-examination and treatment to prevent cluster infections in these centers. Tuberculosis may present any clinical signs in the senior people, and, thus, this disease should be suspected even with no typical clinical signs and radiology. Besides, decreased body weight, weakness and cough may result from aging. The workers and care takers should accept the education for tuberculosis prevention for close monitoring the health status of the residents. The doctors should be informed about any patient having fever, even if it is mild, and cough for early examination, diagnosis and treatment of tuberculosis.

The diagnosis and treatment of tuberculosis, and radiograph estimation is a highly professional event, and each medical facility should strengthen related tuberculosis education. The governmental authorities should also strengthen the supervision and assessment for the quality of radiograph estimation in these medical facilities.

Conclusion

In our study, the average TB incidence in the senior centers in Taipei City during these 3 years was 810 cases per 100 thousand people, which was 15.5 times of the average incidence in Taipei City (52.11 cases per 100 thousand people) and 3.7 times of the average incidence in the population of 65 years old or above (220 cases per 100 thousand people). The causes of higher TB incidence in these senior centers are: 1. higher risk of TB infection in senior people may due to

aging, chronic diseases, organ functional deficiency, medicine and malnutrition; 2. the transmission may be facilitated by the crowded environment and close contact with other people.

Noticeable, 81 TB patients (38.2%) were found during regular examination and this high incidence may be due to active examination and early detection.

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