EPIDEMIOLOGY

Immigrants do not transmit tuberculosis more than indigenous patients in Catalonia (Spain)

Pere Godoy [a,b,c,*], Joan A. Caylà [c,d], Gloria Carmona [a], Neus Camps [a], Josep Álvarez [a], Anna Rodés [a], Neus Altet [a], Jose-Maria Pina [a], Irene Barrabeig [a], Àngels Orcau [d], Ignasi Parron [a], Miquel Alsedà [a,b], Jaume March [a,b], Núria Follia [a], Sofia Minguell [a], Àngela Domínguez [c,e] the Working Group on the Study of Contacts of Tuberculosis Patients of Catalonia (FIS 04/2109)[f]

[a] Department of Health, Generalitat of Catalonia, Spain
[b] Faculty of Medicine, University of Lleida, Spain
[c] Ciber de Epidemiología y Salud Pública CIBERESP, Spain
[d] Public Health Agency of Barcelona, Spain
[e] Department of Public Health, University of Barcelona, Spain

ARTICLE INFO

SUMMARY

Background: Immigrants may not transmit tuberculosis (TB) more than indigenous patients. The objective was to study the prevalence of TB infection among contacts of immigrant and indigenous TB patients and the risk factors associated with latent TB infection.
Methods: Contacts of TB cases recorded in 2005 and 2006 were surveyed using a standardized Health Department questionnaire. Infections were diagnosed using the tuberculin skin test (TST) (cut-off ≥ 5 mm). The risk of infection was determined by multivariate logistic regression and the adjusted odds ratios (aOR) with the 95% confidence intervals (CI) were calculated.
Results: The study of contacts was completed in 1329 cases of TB. The prevalence of infection was 32.3% (3038/9406) in all contacts, 41.4% in contacts of immigrant cases and 29.2% in contacts of indigenous cases. In the multivariate analysis, immigrant index cases were not associated with an increased risk (aOR = 0.9; 95%CI: 0.8–1.0). The prevalence of TST conversion was 10.0% (296/2969) in all contacts, 11.2% in immigrant contacts and 9.7% in indigenous contacts ($p = 0.158$).
Conclusions: Immigrants do not transmit TB more than indigenous TB patients. Infections which may have occurred in the countries of origin of immigrants were detected by the systematic study of contacts.

1. Introduction

Latent tuberculosis infection (LTBI) is diagnosed by a positive tuberculin skin test (TST) result or by interferon-gamma release assays (IGRA) in the absence of clinical or radiological signs of tuberculosis (TB).[1] This diagnosis is controversial because the tests are aimed at detecting the adaptive immune response and not the infection itself.[2] Therefore, these tests are recommended in groups having a higher probability of LTBI.[1,3]

The contacts of patients with TB are at increased risk of LTBI and TB than the general population. Therefore, investigation of contacts of all patients with active TB reported to public health services is highly encouraged.[4] The objectives are to reduce morbidity and mortality through early detection and appropriate treatment of LTBI, and to eliminate transmission by identifying and controlling sources of infection.[1,4] Although the investigation of contacts is now systematic and various recent guidelines have been published, the recommendations should be on empirical data.[1–3]

As immigrants have a higher risk of TB, especially in the first years after immigration, identification of LTBI in immigrants is a priority.[5] Some studies suggest that the study of contacts in immigrants may be more effective than systematic screening in identifying both persons most at risk of TB and infections that may have occurred before immigration to the new country.[1,6–8]

The objectives of this study were to describe and compare the prevalence of LTBI and TB among contacts of immigrant and indigenous TB patients and to study the risk factors associated with LTBI in Catalonia (Spain).

* Corresponding author. C/ Alcalde Rovira Roure, 2, 25006 Lleida, Spain. Tel.: +34 973 701634; fax: +34 973 246562.
E-mail address: pere.godoy@gencat.cat (P. Godoy).
[f] The members of the Working Group on the Study of Contacts of Tuberculosis Patients of Catalonia (FIS 04/2109) are listed in the Appendix section.

2. Patients and methods

2.1. Design, setting and population

We carried out an epidemiological study of the prevalence of LTBI and TB in contacts of immigrant and indigenous incident cases of TB recorded in 2005 and 2006 in seven of the eight epidemiological surveillance units in Catalonia, (Spain), which cover 5,402,131 inhabitants (77% of the total population of Catalonia). The incidence of TB in Catalonia in 2006 (22 per 10^5) and the percentage of TB cases in immigrants (37.9%) was similar in the participating and nonparticipating epidemiological units and therefore the study sample may be considered representative of the total Catalan population. An index case was defined as the first case detected, which generated the study of contacts. Contacts were studied in various steps. Cases of TB identified by physicians and reported to the public health services of the Department of Health were considered index cases. Patients were interviewed to obtain information on possible contacts. A concentric circle approach was used to prioritize the investigation of contacts according to their degree of exposure to the index case. Cohabitants and close contacts of the index case were first evaluated and the investigation was widened to include contacts with less exposure if the prevalence of LTBI in close contacts was greater than that expected in the general population.

People exposed to TB were invited to have a TST test with 2 units of RT 23. An induration ≥ 5 mm was considered positive. In people with a negative test in whom the last exposure was less than three months ago, another TST was recommended after three months, because conversion to the TST can occur up to 10 weeks after exposure. A chest X-ray was made in contacts with a positive TST and in young children and immunocompromised subjects with a negative TST to rule out active TB.

2.2. Variables

Public health technicians conducted an epidemiological survey for each case of TB and each contact. The variables collected from index cases were: country of origin, age, sex, site of TB, chest radiography, bacteriology, diagnostic delay (difference in days between onset of symptoms and initiation of treatment), HIV infection, injecting drug use (IDU), smoking, risk alcohol consumption (daily consumption of more than 4 standard units for men or 2 for women or weekly equivalent. A standard unit equals 10 g of alcohol). Variables collected in contacts were: LTBI and TB, country of origin, age, sex, cohabitation with the index case, and BCG vaccination. Patients who denied having contacts, who lived alone, or refused to collaborate, were excluded.

2.3. Data analysis

The prevalence of LTBI and TB and the 95% confidence intervals (CI) were calculated. The relationship between the dependent variable (LTBI) and the two principle independent variables (country of origin of the index case and country of origin of the contact) was assessed using the odds ratio (OR) and 95%CI. To analyse the interference of the BCG vaccine, the independent contribution of each variable to LTBI was calculated in nonBCG-vaccinated contacts by adjusting the OR (aOR) for statistically significant variables in the bivariate analysis of index cases (country of origin, sex, age, diagnostic delay, site of tuberculosis, bacteriology of respiratory samples, cavitary lesions, respiratory symptoms, smoking and alcohol consumption) and contacts (country of origin, sex, age, and cohabitation) using a logistic regression model. The final regression model was established through a progressive

hierarchical backward stepwise system. The inclusion and exclusion criteria used were: $p < 0.05$ for model entry and $p > 0.10$ for output, according to Wald statistics.

2.4. Data confidentiality and ethics statement

The project was approved by the Fondo de Investigación Sanitaria (Spanish Fund for Health Research, FIS 04/2109) and data were recorded and stored by the Directorate General for Public Health, Department of Health. All information was processed confidentially and regulations on observational studies were strictly observed.

3. Results

A total of 2239 cases of TB were detected, and contacts were studied in 59.4% cases (1329/2239) who agreed to participate and had contacts. In the index cases who participated, 68.6% (912/1329) were indigenous subjects and 31.4% (417/1329) immigrants, 37.2% (495/1329) were female, 78.2% (1039/1329) were aged 15–64 years, 37.3% were smokers and 15.8% had risk alcohol consumption. Clinically, 83.4% (1108/1329) had pulmonary TB, 38.8% (430/1108) had cavitary lesions, 62.5% (692/1108) had positive direct sputum microscopy and 24.1% (256/1061) had a delay in diagnosis >89 days (Table 1).

Table 1
Characteristics of index cases of tuberculosis with contact tracing ($n = 1329$). Catalonia (Spain).

Variables	N	%
Sex		
Female	495	37.2
Male	834	62.8
Age (years)		
0–14	87	6.5
15–44	784	59.0
45–64	255	19.2
>64	203	15.3
Immigrant		
Yes	417	31.4
No	912	68.6
Smoking		
Yes	495	37.3
No	834	62.7
Alcohol		
Yes	209	15.8
No	1119	84.2
*IDU**		
Yes	27	2.0
No	1302	98.0
HIV infection		
Yes	63	4.7
No	1266	95.3
Pulmonary TB		
Yes	1108	83.4
No	221	16.6
Cavitary lesions (pulmonary TB)		
Yes	430	38.8
No	678	61.2
Microbiology (pulmonary TB)		
BK+	692	62.5
BK− and culture+	255	23.0
Negative	161	14.5
Symptoms		
Yes	1072	92.0
No	93	8.0
Diagnostic delay (days)		
<30	376	35.4
30–59	261	24.6
60–89	168	15.8
>89	256	24.1

* IDU, injecting drug user.