
Completion of screening for latent tuberculosis infection among immigrants

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SUMMARY

The objective of our study was to evaluate the sociodemographic factors associated with completion of screening for latent tuberculosis infection (LTBI) among undocumented immigrants in Brescia, Italy. Screening for LTBI was offered to 649 immigrants; 213 (33%) immigrants completed the first step of screening; only 44% (55/124) of individuals with a positive tuberculin skin test result started treatment for LTBI. The univariate analysis showed that being unmarried, of Senegalese nationality and being interviewed by a health-care worker with the same native language as the immigrant were significantly associated with completion of screening for LTBI. In the multiple logistic regression, being interviewed in the native language of the health-care worker (OR 2.5, 95% CI 1.3–4.8, $P=0.004$) and being of Senegalese origin (OR 2.3, 95% CI 1.4–3.6, $P=0.0005$) were independently associated with adherence to LTBI screening. Our results suggest that knowledge of the sociodemographic characteristics of immigrants, and the participation of health-care workers of the same cultural origin as the immigrant during the visits, can be an important tool to improve completion of screening for LTBI.

INTRODUCTION

Tuberculosis has become a public health priority, in industrialized countries also, due to recent phenomena like the AIDS (acquired immunodeficiency syndrome) pandemic, micro-epidemics in closed environments (hospitals, jails, shelters) and increased migratory flow from high endemic tuberculosis countries [1].

In countries with low tuberculosis prevalence, like Italy, identification and treatment of latent tuberculosis infection (LTBI) can be a cost-effective public

health strategy, especially if directed towards high-risk groups for tuberculosis reactivation [2, 3]. Immigrants from high endemic tuberculosis countries are considered a high-risk category and screening for latent infection and preventive treatment are part of health policies for tuberculosis control in many industrialized countries [4, 5]. Despite the fact that screening and treatment of LTBI in recently arrived immigrants is officially recommended, adherence to such screening programmes by immigrants is usually low, especially if they are undocumented. In Brescia, an industrialized city in north-east Italy, studies carried out in the mid-1990s have shown satisfactory rates of completion of screening among undocumented immigrants [6], but low rates of adherence to preventive therapy [7]. In the last few years, the

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flow of immigrants to Brescia has changed, with an increasing percentage of individuals from Asia (mainly Pakistan and China) and Eastern Europe.

The present study aims at evaluating the socio-demographic factors associated with completion of screening for LTBI among undocumented immigrants who have recently arrived in Italy, and in this way offering new tools to implement better strategies for tuberculosis control in this high-risk group.

SUBJECTS AND METHODS

Study design

A prospective observational study was performed from June to December 2001 that involved immigrants who received medical assistance at the outpatient clinic for undocumented immigrants owned by Azienda Sanitaria Locale of Brescia. The present study is the initial phase of a protocol that aims at evaluating the cost-effectiveness of different regimens of treatment for LTBI among immigrants.

The inclusion criteria for an immigrant to screening were: immigration from a high endemic tuberculosis country (prevalence of tuberculosis cases $\geq 50/100\,000$); arrival in Italy within the last 5 years; intention to stay in Brescia for at least 6 months; dwelling or working in the city of Brescia; verbal consent to participate in the screening, and being aged between 18 and 35 years. Exclusion criteria were active tuberculosis; pregnancy; known intolerance or adverse reactions to isoniazid, rifampin or pyrazinamide; hepatic diseases (aminotransferase levels four times above the reference values); previously completed treatment for tuberculosis disease or LTBI, and a history of convulsions.

The immigrants with criteria to participate in the screening for LTBI were invited, after the medical visit, to have a private interview with a physician during which the study protocol was presented and participation in the screening was proposed. Interviews lasted for an average of 20 min. The interviews were carried out daily by three physicians speaking Italian, English, French, Portuguese and Arabic with the use of printed material in Italian, English, Arabic and French. Portuguese and Arabic were the native languages of two physicians of the medical staff.

If the individual agreed to take part in the study (verbal consent), he/she was asked to give the following cultural and sociodemographic data: gender, age, civil status, country of origin, educational level,

duration of stay in Italy, religion and languages spoken. Participants received an appointment for a tuberculin skin test (TST) (5 IU PPD-S by the Mantoux method) and a chest radiograph. Both examinations were performed in a respiratory diseases clinic adjacent to the outpatient clinic for undocumented immigrants, but not always on the same day as the first visit.

Immigrants with positive TST results (skin induration ≥ 10 mm) and normal chest radiographs were further screened for serum aminotransferase and bilirubin levels. Blood tests were performed at another medical unit, 3 km from the outpatient clinic for undocumented immigrants. Immigrants that returned with normal blood test results were sent to the Institute of Infectious Diseases of the University of Brescia to start LTBI treatment, after supplying written informed consent.

Screening for LTBI was considered completed when the TST was done and read as well as the chest radiograph and hepatic function blood tests (in the case of individuals positive for the TST).

The outpatient clinic for undocumented immigrants offers first-level medical assistance on a 5 days per week basis. All medical visits and examinations were free of charge.

Statistical analysis

The association of sociodemographic data with the completion of LTBI screening was measured by the χ^2 test; the odds ratios (OR) of the association with their respective 95% confidence intervals (CI) were calculated. We used the *t* test to compare continuous variables. Regression models to identify the variables independently associated with LTBI screening completion were constructed using the variables that were significant in the univariate analysis ($P \leq 0.05$), controlled by sex and age. For data management we used Access 97 (Microsoft); and for statistical analysis SPSS for Windows, version 11.0 (SPSS Inc., Chicago, IL, USA) was adopted.

RESULTS

Study sample

From June to December 2001, a total of 1613 undocumented immigrants made their first visit the outpatient clinic for undocumented immigrants for health assistance. Out of these, 680 (42%) presented at least one of the exclusion criteria or had medical

Table 1. Sociodemographic characteristics of immigrants enrolled and not enrolled in the latent tuberculosis infection (LTBI) screening, Immigrants' Outpatient Clinic, Brescia

Sociodemographic characteristics	Enrolled in LTBI screening (N=617) n (%)	Not enrolled in LTBI screening (N=316) n (%)	P value	Total (N=933) n (%)
Gender				
Female	186 (30)	82 (26)	0.21	268 (29)
Male	431 (70)	234 (74)		665 (71)
Age (mean)†	27 (s.d. ±3.98)	27 (s.d. ±4.66)	0.15*	891 (95.5)
Civil status†				
Unmarried	387 (78)	194 (61)	<0.005	581 (72)
Married	106 (22)	122 (39)		228 (28)
Religion†				
Muslim	274 (55)	169 (64)	0.07	443 (58)
Christian	202 (41)	83 (31)		285 (37)
Hindu	12 (2)	6 (2)		18 (2)
Other	9 (2)	7 (3)		16 (2)
Geographic area of origin†				
Sub-Saharan Africa	240 (39)	65 (22)	<0.005	305 (34)
Northern Africa	134 (22)	82 (27)		216 (24)
Eastern Europe	91 (15)	72 (24)		163 (18)
Pakistan	63 (10)	39 (13)		102 (11)
Latin America	44 (7)	12 (4)		56 (6)
Southeast Asian	24 (4)	13 (4)		37 (4)
China	11 (2)	16 (5)		27 (3)

* *t* test.

† Information not available for all subjects.

conditions (infectious diseases, traumatic lesions, etc.) that contraindicated LTBI screening. Moreover, 10 (1%) of them were not screened for LTBI as it was not possible to communicate with them.

Fifty-eight per cent (933/1613) were eligible for LTBI screening. Eight (1%) refused screening; 308 (33%) were not contacted by the medical staff or did not wait for the interview after the medical visit and hence were not included in the study. A total of 617 (66%) immigrants were enrolled in the study protocol. Table 1 presents the sociodemographic data of immigrants enrolled and not enrolled in the LTBI screening. Data on immigrants from Pakistan and China were listed separately since they were the unique representative countries of their geographical area.

There was no statistically significant differences regarding gender, mean age and religion between immigrants enrolled and not enrolled in the screening. Nevertheless, married immigrants and those from Eastern Europe and China presented a lower percentage of participation in LTBI screening (Table 1).

Apart from 617 immigrants visiting the outpatient clinic for undocumented immigrants for the first time, LTBI screening was administered to 32 further patients that did not consult, for the first time, but who had not previously been screened, giving a total sample of 649 immigrants to whom LTBI screening was offered.

Immigrants to whom LTBI screening was offered were predominantly male (69%), with a mean age of 27 years (s.d. ±4.0) and a mean duration of stay in Italy of 16.1 months (s.d. ±12.3). They came from 35 different countries. Countries with a percentage of immigrants above 10% of the study sample were Senegal (17%), Nigeria (15%) and Egypt (10%).

Prevalence of LTBI

Among the 649 immigrants that agreed to take part in LTBI screening, 213 (33%) returned with the TST result; 124 (58%) had a skin induration ≥10 mm; 89 (42%) immigrants with negative TST results were excluded from the second step of screening.

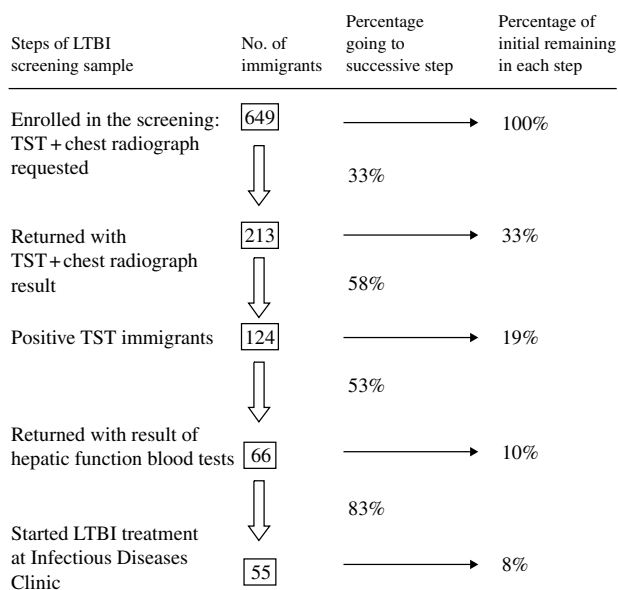


Fig. Flow of immigrants through the different steps of latent tuberculosis infection (LTBI) screening, Immigrants' Out-patient Clinic, Brescia.

Female immigrants presented a lower risk for LTBI (OR 0.4, 95% CI 0.2–0.8; $P=0.008$). Immigrants from North Africa had the highest rate of LTBI (64%, 28/44), followed by those from Latin America (62%, 15/24) and Pakistan (61%, 8/13).

No chest radiographic findings suggestive of active tuberculosis disease were present. Only one patient from Senegal presented radiological alterations indicative of pulmonary tuberculosis in the past. He was excluded from the study because he had already undergone 12 months tuberculosis therapy, although he had earlier denied having any previous tuberculosis disease.

Flow of immigrants during LTBI screening protocol

A total of 213 (33%) immigrants completed the first step of screening: 89 TST-negative plus 124 TST-positive immigrants (Fig.). The higher percentage of non-adherence (67%) was observed in the first step of screening, i.e. after the first visit, when TST and chest radiograph were requested. The lower rate of non-adherence (17.0%) was observed in the last step of screening, when the immigrant was sent to the Institute of Infectious Disease to start LTBI treatment. Among immigrants with a positive TST, only 44% (55/124) started LTBI treatment.

Factors associated with adherence to LTBI screening

Sociodemographic factors associated with completion of LTBI screening (TST, chest radiograph and hepatic function blood tests, where appropriate) were analysed. A total of 155 (24%) immigrants completed all the screening procedures counselled by the protocol (89 TST negative, plus 66 TST positive that underwent chest X-ray and blood tests). In the univariate analysis (Table 2) we observed a higher rate of adherence to LTBI screening among unmarried immigrants (24% vs. 14% married; OR 2.0, 95% CI 1.1–3.6, $P=0.02$) and among individuals from Senegal (37% vs. 21% other nationalities; OR 2.1, 95% CI 1.4–3.3, $P=0.001$). Neither the immigrant's capability to speak/understand Italian nor the use of the immigrant's mother tongue by the health-care worker during medical visits were associated with a higher adherence to LTBI screening. However, when the health-care worker and immigrant had the same mother tongue (Arabic or Portuguese), the immigrant's adherence to LTBI screening was significantly higher (40% vs. 23%; OR 2.3, 95% CI 1.2–4.2, $P=0.02$).

In the multiple logistic regression, visits conducted in the native language of the health-care worker (OR 2.5; 95% CI 1.3–4.8, $P=0.004$) and being of Senegalese origin (OR 2.3, 95% CI 1.4–3.6, $P=0.0005$) were independently associated with increased adherence to LTBI screening.

DISCUSSION

The objective of our study was to evaluate the socio-demographic factors that could be associated with adherence to LTBI screening among undocumented immigrants in the city of Brescia. We observed a low rate (33%) of adherence to the first step of LTBI screening and only 44% of TST-positive immigrants started LTBI treatment.

In a previous study in the same medical service [6], from 1996 to 1997, adherence to LTBI screening (71%) was higher than that observed in the present study. Since the screening system did not change significantly throughout this time, this observation is likely to reflect differences inherent in the immigrant population to which LTBI screening was offered. In our study, immigrants came from 35 different countries, were younger (in the previous study 18% of immigrants were >35 years old) and very recently arrived in Italy (the mean duration of stay was

Table 2. Univariate analysis of cultural and sociodemographic factors associated with adherence to LTBI screening among undocumented immigrants, Immigrants' Outpatient Clinic, Brescia

Variables	Completed LTBI screening <i>n</i> = 155 (%)	Not completed LTBI screening <i>n</i> = 494 (%)	<i>P</i> value	OR (95% CI)*
Gender				
Female	46 (30)	156 (32)	0.73	1.07 (0.7–1.6)
Male	109 (70)	338 (68)		
Age (yr)†				
18–25	60 (39)	202 (42)	0.70	1.09 (0.7–1.6)
26–35	92 (61)	283 (58)		
Civil status†				
Married	15 (13)	93 (23)	0.02	2.0 (1.1–3.6)
Unmarried	102 (87)	319 (77)		
Religion†				
Muslim	65 (56)	219 (55)	0.91	1.0 (0.6–1.4)
Christian	50 (44)	176 (45)		
Years of school†				
≥13	21 (19)	92 (24)	0.37	1.3 (0.8–2.2)
<13	89 (81)	295 (76)		
Arrival in Italy†				
<2 years	78 (71)	266 (67)	0.49	0.8 (0.5–1.3)
≥2 years	32 (29)	132 (33)		
Speak Italian†				
No	42 (34)	132 (32)	0.74	0.9 (0.6–1.4)
Yes	83 (66)	281 (68)		
Native language used in the visits†				
No	87 (57)	278 (57)	0.93	1.0 (0.7–1.4)
Yes	65 (43)	212 (43)		
Native language of HCW†				
No	136 (88)	464 (94)	0.01	2.3 (1.2–4.2)
Yes	19 (12)	28 (6)		
Senegalese				
No	114 (73)	417 (85)	0.001	2.1 (1.4–3.3)
Yes	41 (27)	71 (15)		

* OR, Odds ratio; CI, confidence interval.

† Information not available for all subjects.

16 months), all these factors could have led to reduced completion of LTBI screening.

It was observed that immigrants from Senegal presented a higher probability of LTBI screening completion. The Senegalese represent an immigrant community that had settled in Brescia earlier in the mid-1980s. They live together in community dwellings where tuberculosis control interventions have been carried out in the past [8]. Such a social support and background information on tuberculosis could have had a positive impact on the perception of self-health care even in the case of undocumented immigrants.

The presence of a health-care worker with the same native language as the immigrant during medical visits was the other factor independently associated with LTBI screening completion. Immigrants interviewed by a physician with Arabic or Portuguese as their mother tongue had a probability of LTBI screening completion 2.5-fold higher than immigrants interviewed in English, French or Italian.

In a dossier on immigration in Italy, published by Caritas [9] in 2001, it was estimated that there are at least 122 different languages spoken by the immigrants living in Italy. Knowledge of the languages

used by the more representative nationalities of immigrants attending LTBI screening services could be a strategy to improve the rate of screening adherence. However, according to the results of our study, it is probably not sufficient to speak the immigrant's mother tongue. The importance of the health beliefs of tuberculosis patients, especially immigrants' beliefs, has been emphasized by other authors [10, 11]. The presence of a health-care worker having the same mother tongue probably offers a better linguistic resource and provides a possible opportunity for immigrants to identify themselves with other socio-cultural factors that could play an important role in the setting up of a confidential relationship between the immigrant and medical care providers.

Values of variables which were used to measure the association with screening completion were not available for some immigrants. The loss of information was particularly relevant for religion (37% of non-responders), while in the case of civil status it was variable; the non-responder immigrants (18%) could have altered the significant association found. However, since the variables that showed a stronger association with screening completion were also those with a lower rate of missing values, we suggest that the results described are probably reasonably accurate.

The implementation of LTBI screening programmes is indicated only in settings where LTBI treatment and follow-up can be offered. Adherence rates to LTBI treatment is generally lower than that observed among patients with tuberculosis disease. A meta-analysis of different studies on LTBI treatment found an adherence rate of only 65% among 1 084 760 individuals submitted to tuberculosis preventive therapy [12]. Adherence to LTBI treatment among immigrants is even lower. In a prospective study conducted in Brescia and Turin with recently arrived immigrants (undocumented or not) the rate of completion of LTBI treatment varied from a minimum of 7% (900 mg isoniazid twice a week for 6 months) to a maximum of 41% (300 mg isoniazid daily for 6 months) [7].

The determinants of adherence to LTBI and tuberculosis disease treatments are not clearly known. Beliefs and attitudes culturally determined can lead to misunderstanding related to tuberculosis, with negative consequences for adherence to treatment [11]. We consider that much of the strategies described by other authors to promote adherence to LTBI treatment, e.g. patient education [13], the use

of cultural mediators from the same socio-cultural patient's origin [14], monetary incentives to return for medical visits [15] and the adoption of directly supervised preventive treatment (DOPT) [16] could also be used by the medical services responsible for tuberculosis control in cities like Brescia.

The increasing flow of immigrants from high endemic tuberculosis areas to Western European countries represents a new challenge to national tuberculosis programmes aimed at eliminating tuberculosis. We hope that the results of our study will contribute to constructing a better strategy to increase LTBI screening completion and to improve the rate of adherence to tuberculosis preventive therapy among immigrants.

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