



Single IFN- γ assay testing is of limited use for health care workers occupational exposure screening in a high tuberculosis prevalence country

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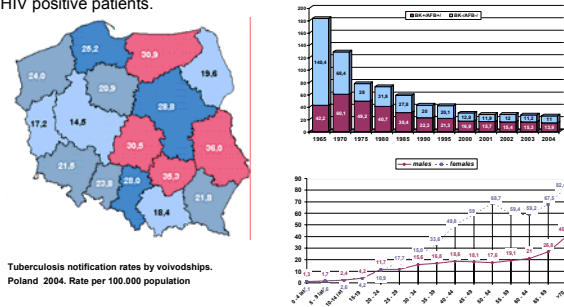
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Introduction

Tuberculosis (TB) remains an emerging problem in Poland with an incidence rate of 24.9, which is one of the highest in European Union. Despite wide access to health care and free TB treatment death rate, although decreases, remains 2.4. The problem with MDR TB arises with increased number of travelers from former USSR republics and is estimated as 6.5%. Among HIV-positive patients TB is the most frequent AIDS defining illness with an incidence rate of 1.62/100 patients/year.

Currently there is 2300 HIV(+) patients registered in the out-patient clinic of Hospital for Infectious Diseases in Warsaw. HIV/TB co-infected patients are not more contagious, yet the risk of undiagnosed, active TB infection is much higher among HIV-positive compared to HIV-negative. The exposure risk for health care workers, especially working with HIV-positive patients, might be therefore high, yet never has been assessed. On the other hand HCWs themselves might pose a serious risk for their patients, if TB infected. Therefore HCWs screening is an important element in TB control program, but is not done in Poland.

As most of the country population, including HCWs, has been BCG vaccinated TST is of limited use and is not routinely used for HCWs testing. We conducted the study to estimate the prevalence of latent TB infection among HCWs and estimate the risk of occupational exposure for personnel working with HIV positive patients.



Material and Methods

The QuantiFERON in Tube TB Gold® test (QFT) was offered to all members of the staff at the hospital staff despite their exposure risk. The information was advertised on a hospital information board and each department was informed independently on the phone. Blood samples were taken by one of three study nurses.

Whole blood was stimulated in tubes with ESAT-6, CFP-10 and TB7.7, saline or mitogen, and IFN- γ was determined in the supernatant according to the instructions provided by the manufacturer. Occupational exposure included staff working with TB patients and for those who were seeing those patients the frequency was asked. The exposure was defined as high for doctors and nurses and low for laboratory, cleaning and other staff. Non-occupational exposure and previous TB history were also self-reported.

In statistical analysis Chi-squared, Kruskal-Wallis and t-test were used for univariable analysis as appropriate. Confidence interval (CI) of 95% was accepted. All analyses were performed using SAS version 9.1 (Statistical Analysis Software, Cary, NC, USA)

Results

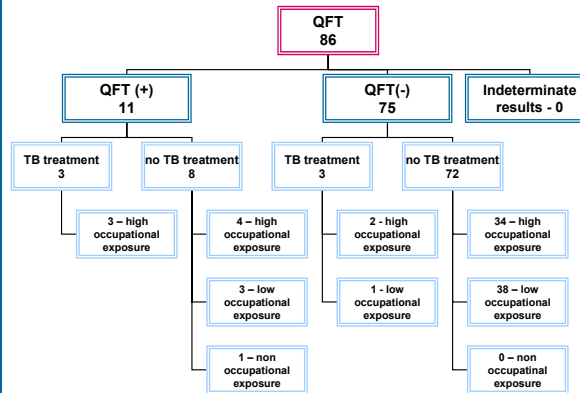
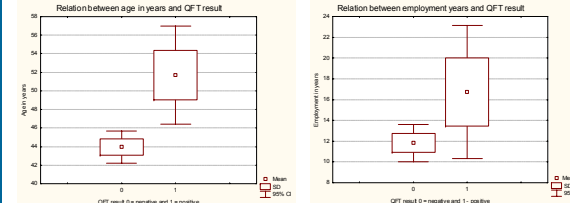


Diagram 1 Distribution of level of occupational and non-occupational exposure in QFT positive and negative group



	QFT (+) n=11	QFT(-) n=75	p value
		Mean (SD)	
Age	51.7 (8.9)	44.0 (7.7)	0.003
Years of employment	16.7 (10.8)	11.8 (7.9)	0.1
		n (%)	
TB treatment in past	3 (27.3)	3 (4.0)	0.03
		n (%)	
Occupational exposure (OEX)	8 (72.7)	61 (81.3)	0.5
		n (%)	
Frequency of OEX			
every day	7 (87.5)	41 (67.2)	
every week	1 (12.5)	15 (24.6)	
every month	0 (0)	2 (3.3)	0.68
rare	0 (0)	3 (4.9)	
		n (%)	
Risk groups			
High - nurse/doctor	7(63.6)	36(48.0)	0.5
Low - lab/other	4(36.4)	39(52.0)	

Table 1 Univariate analysis of factors related to positive and negative QFT result

Results

From 411 hospital staff only 86 persons (20.9%) wanted to participate in the study. Among them 18 were physicians (19.4% of all physicians), 28 nurses (20.1%), 30 other medical staff (39.0%) and 10 non medical staff (9.8%). Mean age was 44.95 (SD 8.22) and mean employment time in current position was 12.45 (SD 8.42) years. 25% from that group has started their current job more than 10 years ago, between 1966 and 1994.

69 (80.2%) persons have reported working with TB patients, among them 48 (69.57%) every day and 16 once per week (23.19%). 17 persons denied having any occupational TB exposure, as they were working at the main hospital office. All together 6 persons in the study group (7.0%) had been treated for TB during their childhood. One person had non-occupational exposure in the past and did not receive treatment. There was no active TB infection in connection to occupational exposure reported before the study.

11(12.8%) persons were QFT positive and there were no indeterminate results. Among QFT positive HCWs one person had non occupational TB exposure. Three persons were treated for TB in their childhood, but also all three had high occupational exposure. Eight of QFT positive persons had no history of TB treatment, four had high occupational exposure and three had low occupational exposure. Among those who had high occupational exposure all four were seeing TB patients every day.

In the low occupational exposure group two persons had no contact with patients during work routines and one person reported seeing TB patients everyday.

There was a statistically significant difference between QFT positive and QFT negative group in age (p=0.003) and proportion of persons with prior TB treatment (p=0.03); and no statistically significant difference in duration of employment (p=0.1), hospital contact with TB patients (p=0.5) and its frequency (p=0.68). The details are shown in Table 1.

Conclusions

12.8% of the HCW had a positive QFT result. There was a correlation between a positive QFT and higher age, as well as prior TB infection/contact, but no with occupational exposure and duration of employment. These results suggest that environmental factors are of comparable impact on HCWs as work factors in a population with high prevalence of TB. Distinguishing between occupational exposure and population exposure is very difficult.

A single QFT test in HCWs screening is of limited value, unless performed at baseline before starting work, especially when high occupational exposure is expected. The schedule of repeated testing should be further explored. Potential limitation for such an approach is not well recognized and defined conversion and reversion among HCWs in serial testing with QFT.

The approach to HCWs who are reporting non-occupational exposure or prior TB, before starting to work, needs to be further evaluated.

In our study we met a very low response rate to offered convenient and free of charge testing. It suggests that knowledge about TB epidemiology, even among medical staff, is low and needs to be improved. As in each testing, in case of TB control there will be no success without good and wide education program which helps to understand the reasoning behind exposure tracking and benefits earned from being tested.

Acknowledgements

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