

Molecular detection of *Bartonella quintana* in human body lice from Mexico City

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INTRODUCTION

Bartonella species are gram-negative bacilli that belong to the alpha two subgroup of Proteobacteria. The body louse, *Pediculus humanus corporis*, is the vector of three human pathogens: *Rickettsia prowazekii*, the agent of epidemic typhus, *Borrelia recurrentis*, the agent of relapsing fever, and *Bartonella quintana*, the agent of trench fever, bacillary angiomatosis, endocarditis, chronic bacteremia, and chronic lymphadenopathy [1]. The diseases are mostly prevalent in people living in poor economic conditions, including homeless people and those living in jails or in war situations. Moreover, it has been demonstrated that *B. quintana* was responsible for asymptomatic, prolonged bacteraemia and intermittent bacteraemia in homeless people [2]. An investigation of body lice from homeless people in Mexico City in 1954 demonstrated for the first time the presence of this bacterium in South America and also experimentally reproduced the trench fever illness [3].

The aim of this study was to look for the presence of *B. quintana* and *R. prowazekii* in body lice collected from marginalised people in Mexico City by the use of molecular methods to confirm the usefulness of this tool in the epidemiological surveillance of emerging and reemerging pathogens.

MATERIAL AND METHODS

In 2006, during a scabies outbreak in people living in overcrowded conditions in jails and people who were homeless, we detected an infestation of these people with human body lice. The institution personnel with previous short

training collected the ectoparasites in sterile microtubes that were labelled separately. The microtubes were stored for months at ambient temperature until being sent to Marseille, France. The body lice were transferred to individually labelled tubes and stored at -20°C until the DNA extraction was performed by the use of the QIAmp Tissue Kit (Qiagen, Hilden, Germany). DNAs were screened for the presence of *Bartonella* sp. and *R. prowazekii* by the use of specific primers and probes in a real time (RT) PCR targeting the 16S-23S rDNA intergenic spacer (ITS), and *gltA*, respectively. Positive samples were further amplified in a standard PCR targeting partial ITS for the identification of the *Bartonella* at the species level with primers previously described [1].

RESULTS

A total of 293 body lice were collected from 110 persons, including 98 prisoners in three different jails and 12 homeless people (Table 1). The rate of infestation of body lice was higher among people living in jails, compared with the people living in refuges for homeless people. The higher number of infested persons with body lice (53) was detected in Jail F (psychiatric prisoners) (Table 1).

No PCR products were obtained at screening for any of the lice when primers and probe targeting the partial sequence of *gltA* from *R. prowazekii* were used, indicating a lack of infection of lice with this bacterium. Conversely, 83 out of 293 body lice (28.3%) were found to be positive for *B. quintana*. A total of 39 persons (35%) had one or more body lice positive for *B. quintana*, including 37 prisoners and two homeless people (Table 1). The authorities implemented an eradication campaign for body lice in this population, using physical and chemical methods with good results, including in jail F where psychiatric prisoners prefer to live with their own 'companions': the body lice. (Because they play with them and have competitions: which one runs faster or how long body lice can live exposed directly to the sun – they say 6 h) They consider the body lice to be like their own family because they are sure they have their blood.)

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Table 1. Number of people and *B. quintana* positive body lice in the different locations in Mexico City

Collection place	No. of people infested	No. of lice tested	No. of lice <i>B. quintana</i> positives (%)	No. of people with positive lice (%)
Jail D (regular)	36	66	17 (26%)	13 (36%)
Jail E (regular)	9	11	0 (0%)	0 (0%)
Jail F (psychiatric)	53	155	63 (41%)	24 (45%)
Homeless	12	61	3 (5%)	2 (17%)
Total	110	293	83 (28%)	39 (35%)

DISCUSSION

In this study we report for the first time the molecular detection of *B. quintana* in body lice from Mexico. Although *B. quintana* was detected in body lice from homeless people in Mexico in 1954 [3], no detection by the use of modern molecular methods has been achieved to date. We found a high rate of infection of body lice as well as a high prevalence of body louse infestations in these people. The presence of body lice is a great risk in this population as it could potentially lead to epidemic typhus, trench fever and recurrent fever. Although we could not detect *R. prowazekii* in these lice, recent epidemics of louse-borne infections have demonstrated that the prevalence of body louse infestations in persons has reached 90–100% before clinical signs of louse-borne disease were noted. A gigantic outbreak of *R. prowazekii*-induced typhus and *B. quintana*-induced trench fever has been reported in Burundi and transmission of both diseases to such a large number of people has followed a widespread epidemic of body-louse infestation [4].

A high prevalence of antibodies to *R. prowazekii* in the population of Mexico has been recently reported [5], with two probable cases of Brill-Zinsser disease suggesting a human reservoir of latent *R. prowazekii* in this population. The presence of human body lice in this population indicates that there is risk of spreading *R. prowazekii* from an index patient with Brill-Zinsser disease to persons in contact with the patient. In this particular scenario, our findings of a high prevalence of body louse infestations in prisoners and in homeless people is worrying because there is a great risk of an outbreak of epidemic typhus and/or trench fever in this population. The last outbreaks of epidemic typhus in Mexico occurred in 1983 in the State of Chiapas and the State of Mexico, both in the indigenous population [5].

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