Risk factors for sporadic and community acquired Legionnaire's disease metropolitan France, 2002-2004

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Introduction

Legionnaire's disease (LD)

- Common aetiology of community acquired bacterial pneumonia in adults
- High case fatality ratio
- Known risk factors have been mainly described from outbreak studies
- Sporadic, community-acquired LD:
  - Accounts for > 50% of the cases of LD
  - Risk factors remain uncertain

Objective

To identify individual, behavioural and environmental characteristics associated with sporadic and community acquired LD in order to implement preventive measures

Methods

Study methods

- Incident, matched case-control study
- Study period:
Sept. 2002 - Sept. 2004
- Study population: residents in metropolitan France
- Case definition:
  - Biologically confirmed LD
  - Excluding: outbreak, nosocomial or nursing home exposure in the 10 days prior to the onset

Cases & controls

- **Cases:** recruited through mandatory notification
  - Exposure period: 10-days before disease onset
  - Included consecutively until sample size completed (n=600 pairs)
  - Matched with a control 1 : 1
- **Controls:** recruited by GPs of cases
  - Over the same period of exposure as cases
  - Community
  - Not known to be a LD case

Matching variables

- **Age:** < 65 y: ±10 y
  ≥ 65 y: ±5 y
- **Sex**
- **Underlying illness: 3 categories**
  1. no underlying illness
  2. chronic diseases
  3. malignancy, steroid use, immuno-suppression
- **Location of residence within 5 km of case's residence.**

Study variables

Standardized questionnaire:

- **individual:** oxygen use, smoking, alcohol, travel history, home ownership, water use…
- **environmental exposures:** home setting, origin of drinking water, hot water production, air-conditioning, plumber work at home & street, factory nearby and type, working place, aquatic parks…
- **professional and leisure activities:** profession, gardening, aquatic sports…

Results

Cases of legionnaires' disease & controls by type of exposure

Analysis on 546 matching pairs

- Age : 10 - 93 y (median, 55 y)
- M/F sex ratio: 3.6
- Diagnosis by urinary antigen ~ 93%
- Case fatality: 3.5% (19/ 546)
- Underlying illness: 29%
  - Cat 1: 71.1% (*no underlying illness*)
  - Cat 2: 22.5% (*chronic diseases*)
  - Cat 3: 6.4% (*immunodeficiency*)

Individual exposure	Cases n (%)	Controls n (%)	Matched OR (95% CI)
Tobacco	**330** (61%)	**117** (22%)	**8.4** (5.7 12.3)
Travel history	**175** (32%)	**89** (16%)	**2.8** (2.0 - 3.9)
- Hotel	**85** (16%)	**22** (4%)	**4.7** (2.8 - 7.9)
- Camping	**12** (2%)	**2** (< 1%)	**6** (1.3 - 27)
Washbasin for personal hygiene	**59** (11%)	**35** (7%)	**2** (1.2 - 3.2)
Home ownership	**310** (58%)	**420** (79%)	**0.3** (0.2 - 0.5)
Shower	**440** (82%)	**469** (87%)	**0.6** (0.4 - 0.9)
Alcohol	**430** (81%)	**474** (89%)	**0.5** (0.3 - 0.7)

Environmental	Cases n (%)	Controls n (%)	Matched OR (95% CI)
Living in a block of flats	**219** (41%)	**159** (29%)	**2.5** (1.8 - 3.7)
Suburbs vs downtown residence	**141** (47%)	**170** (56%)	**0.7** (0.5 - 0.9)
Road works nearby	**76** (17%)	**113** (25%)	**0.6** (0.4 - 0.8)
Individual hot water system	**440** (84%)	**468** (89%)	**0.5** (0.4 - 0.8)
Air conditioning at home	**10** (2%)	**26** (5%)	**0.3** (0.2 - 0.7)

Leisure activities	Cases n (%)	Controls n (%)	Matched OR (95% CI)
Gardening	**140** (26%)	**214** (40%)	**0.5** (0.4 - 0.7)
Car wash	**59** (11%)	**111** (21%)	**0.5** (0.3 - 0.7)
Use of pressurized water	**6** (1%)	**19** (3%)	**0.3** (0.2 - 0.5)
Aquatic sports	**32** (6%)	**55** (10%)	**0.5** (0.3 - 0.8)
Air conditioning at home	**10** (2%)	**26** (5%)	**0.3** (0.2 - 0.7)

Multivariate model

N = 465 pairs analysed	Matched OR (95% CI)
Tobacco	**8.9** (5.3 - 15.0)
Travel history	
- Hotel	**6.8** (3.1 - 14.8)
- Other	**3.2** (1.8 - 5.9)
Use of Washbasin for personal hygiene	**2.9** (1.4 - 6.2)
Alcohol	**0.3** (0.2 - 0.6)
Home ownership	**0.4** (0.3 - 0.7)
Gardening	**0.4** (0.3 - 0.6)
Use of pressurized water	**0.4** (0.2 - 0.8)

Results

Multivariate model: Tobacco

	Matched OR (95% CI)
Non smoker	Reference
Ex sm. ≤ 20 y	**0.7** (0.4 - 1.5)
Ex sm. > 20 y	**1.2** (0.6 - 2.5)
Smoker ≤ 20 y / ≤ 20 c	**13.1** (4.9 - 34.8)
Smoker ≤ 20 y / > 20 c	**25.7** (6.1- 108.3)
Smoker > 20 y / ≤ 20 c	**6.2** (3.1 - 12.7)
Smoker > 20 y / > 20 c	**26.3** (7.9 - 87.3)

Discussion/Conclusions

Discussion

- Results show a strong association between:
  - LD & Tobacco
  - LD & Travel history
- Concordant to other studies
- Tobacco: first time such a dose-effect response is documented

- Limitations & Bias:
  - Information only on the less severe cases
  - Risk of overmatching over underlying illness and residence
  - Residual confounding
- Some protective exposures are difficult to explain:
  - Alcohol ?
  - Washbasin use, gardening… maybe surrogate variables for physical fitness

These are **Preliminary results**.

Further analysis is ongoing to test:
- colinearity,
- possible differences between matching sets with missing values and the sets analysed,
- and differences between categories.

Conclusions

- Results show a strong association between LD and:
  - Tobacco
  - Travel history
- First time such a dose-effect response for tobacco is documented