Short reports

Strong correlation between *Helicobacter pylori* seropositivity and *Chlamydia pneumoniae* IgG concentrations

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Overall, epidemiological studies indicate a weakly positive association between coronary heart disease (CHD) and chronic *Helicobacter pylori* infection.¹ If *H pylori* infection increases the incidence of CHD, then it may do so by affecting some other vascular risk factor(s). If there is a non-causal association between the infection and CHD, then this must be because of some confounding factors. In either case, it is of interest to know whether *H pylori* is correlated with standard vascular risk factors, blood markers of inflammation or of other persistent infections that have been investigated in relation to CHD, such as *Chlamydia pneumoniae* or cytomegalovirus. We report on the possible correlates of *H pylori* in a British population-based study.

Methods

A total of 8000 volunteers aged 35-64 at entry to a trial of health checks by nurses in Bedfordshire general practices completed questionnaires and gave venous blood samples that were

stored at -80°C.² In the samples of 641 people without a history of CHD who were the controls in another study, measurements were made of blood lipids with standard assays, of C reactive protein and serum amyloid A protein with sensitive immunoassays (IMx, Abbott Laboratories, Illinois, USA), of IgG antibodies to *H pylori* with a commercial ELISA kit (Orion, Pyloriset, Espoo, Finland), and of IgG antibodies to *C pneumoniae* (whole organism antigen) and to cytomegalovirus (whole organism antigen) with time resolved fluorimetry (DELFA, Wallac, Turku, Finland). Our *C pneumoniae* assay showed good agreement with standard microimmunofluorescence in the blood samples of 480 people in another study, (Y-K Wong *et al*, unpublished data) but *C pneumoniae* serology is generally prone to poor reproducibility.¹

Results

The well known associations of *H pylori* seropositivity with age and poverty were seen.¹

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Table 1 Vascular risk factors and other characteristics by *Helicobacter pylori* seropositivity in 641 people

Characteristic	Seropositive (n=294)	Seronegative (n=347)	††	‡‡
<i>Standard vascular risk factors</i>				
Age (y)	60.1 (5.8)	58.0 (6.2)	4.5	2.8*
Male	199 (68%)	233 (67%)	0.2	0.2
Current smokers	102 (35%)	85 (25%)	3.2	2.6*
Body mass index (kg/m ²) (n=640)	26.1 (3.8)	26.2 (3.8)	0.2	0.2
Total cholesterol (mmol/l)	6.29 (1.24)	6.36 (1.21)	0.7	1.5
Low density lipoprotein cholesterol (mmol/l)	3.75 (1.44)	3.63 (1.50)	1.0	1.0
High density lipoprotein cholesterol (mmol/l)	1.27 (0.40)	1.32 (0.41)	1.5	0.6
Triglycerides (mmol/l)	2.16 (1.35)	2.13 (1.29)	0.2	0.7
Systolic blood pressure (mm Hg)	138 (22)	134 (22)	2.0	0.5
Diastolic blood pressure (mm Hg)	79 (13)	79 (12)	0.1	0.2
Physically inactive	215 (73%)	260 (75%)	1.0	1.4
<i>Markers of persistent infection</i>				
<i>Chlamydia pneumoniae</i> concentrations (FC×10 ⁶) (n=640)	114.6 (33.9)	93.4 (41.2)	7.0	5.9***
Cytomegalovirus values (FC×10 ⁶) (n=640)	90.9 (55.30)	81.8 (59.8)	2.0	0.9
<i>Markers of inflammation</i>				
Log C-reactive protein (mg/l)	0.71 (1.22)	0.49 (1.27)	2.2	0.4
Log serum amyloid A (mg/l)	0.95 (0.99)	0.82 (0.95)	1.6	0.9
<i>Markers of socioeconomic status</i>				
Without own car (n=636)	72 (25%)	42 (12%)	4.2	3.6**
In rented housing (n=632)	66 (23%)	31 (9%)	2.7	2.1
Completed education by 16 years (n=630)	264 (92%)	279 (81%)	3.8	3.1*
Employed (n=637)	175 (60%)	237 (69%)	1.6	0.3
Manual workers	140 (48%)	121 (35%)	1.9	1.0
Married (n=630)	240 (83%)	292 (86%)	0.5	0.1

FC=Fluorescence counts. *p<0.01, **p<0.001, ***p<0.00001. †† Tests derived from regression of *H pylori* seropositivity on each characteristic separately. ‡‡ Tests derived from regression of *H pylori* seropositivity adjusting for sex, age, and body mass index (as continuous variables), smoking (current smoker, former smoker, current tobacco consumption, and pack years as continuous variables), and social class (car ownership, housing tenure, age at stopping full time education, employment status, job classification, and marital status). Adjustments for social class were omitted in the regressions involving markers of socioeconomic status. Data shown as mean (SD) and number (percentage).

(Table 1). There was a strong correlation between *H pylori* seropositivity and *C pneumoniae* serum IgG concentrations ($p < 0.00001$), and this was not much changed after adjustment for age, sex, smoking, and markers of social class. The adjusted odds ratio of *H pylori* seropositivity for the top third of *C pneumoniae* concentrations was 2.9 (99% confidence limits 1.4 to 6.2; $p < 0.00001$). As reported in a recent meta-analysis with information on 10 000 people, there were no strong correlations between *H pylori* seropositivity and body mass index, blood pressure, or blood concentrations of lipids or C reactive protein.³ There were also no strong correlations with other factors not reported on previously, such as with exercise or with concentrations of cytomegalovirus serum IgG antibodies or of serum amyloid A protein (table 1).

Discussion

A previous study in 300 healthy British men used microimmunofluorescence to measure *C pneumoniae* antibody concentrations, and it reported no strong correlation between *H pylori* seropositivity and *C pneumoniae* seropositivity.⁴ As larger reports involving measurement of both agents are not available, the strong association between *H pylori* seropositivity and *C pneumoniae* serum IgG concentrations observed in this study of 640 people should be regarded as provisional. *H pylori* is spread from mouth to mouth and/or by the faecal-oral route, whereas *C pneumoniae* is spread in respiratory secretions.¹ Apart from age and, perhaps, poverty (which were standardised for in the study), the agents share no

known risk factors, so such factors cannot explain the strong association observed in this population. Each of these Gram negative bacteria has been investigated in relation to CHD,¹ but as the present study included only people without a history of CHD, it is very unlikely that the presence of unrecognised vascular disease could have artefactually produced these results. The possibility of a spurious association caused by cross reactive antibodies—for example, an immune response to heat shock protein-60⁵—should be tested in future studies. If larger reports demonstrate an association between the presence of *H pylori* and *C pneumoniae*, it would suggest that studies should investigate the possible relevance of coinfection by these and other persistent agents, particularly in relation to CHD.

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