Parental Smoking and Infection with *Helicobacter pylori* among Preschool Children in Southern Germany

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Exposure to parental smoking is known to increase children's susceptibility to a variety of infections. We investigated the relation of parental smoking to infection with *Helicobacter pylori* in a population-based study among preschool children who were screened for school fitness in the city of Ulm, Germany, in 1996. Current infection with *H. pylori* was measured by a ^{13}C-labeled urea breath test. Information on factors potentially related to *H. pylori* infection, including parental smoking in the household, was obtained from children's parents through a self-administered standardized questionnaire. Among 1,201 eligible children, 945 participated in the study (response rate = 79%). Overall prevalence of active infection was 13.7%. After adjustment for confounding factors, we found a strong positive relation between smoking by the father in the household and *H. pylori* infection (odds ratio = 3.7; 95% confidence interval = 2.3–6.1). By contrast, there was a strong negative relation between smoking by the mother and *H. pylori* infection (odds ratio = 0.4; 95% confidence interval = 0.2–0.8) that was most pronounced among children who had been breastfed. These striking patterns cannot be explained by current knowledge. (Epidemiology 1998;9:545–549)

Keywords: child, *Helicobacter pylori*, infection, smoking.

Infection with *Helicobacter pylori* is now considered the major cause of chronic atrophic gastritis and gastric and peptic ulcers[1] and an important risk factor for the development of gastric cancer.[2] Childhood is the critical period during which most *H. pylori* infections are acquired. Direct (oral-oral or fecal-oral) person-to-person spread is the most likely form of transmission of infection,[3] but there is also evidence of waterborne transmission in developing countries.[4] In sharp contrast to developing countries, childhood prevalence is now relatively low in many developed countries, which may reflect major improvements in housing conditions and hygiene.[5] Previous studies have identified age, low socioeconomic status, and poor living conditions during childhood as major risk factors of infection within both developing and developed countries.[4,6,7] The nature of this association is not fully understood. Socioeconomic factors and living conditions during childhood may be related both to exposure to the infectious agent and to susceptibility to colonization of gastric or duodenal mucosa by *H. pylori*.

Exposure to environmental tobacco smoke (ETS) has been shown to be associated with susceptibility to a variety of infectious diseases in childhood, mainly those of the respiratory tract.[8,9] To our knowledge, the relation between exposure to ETS and infection with *H. pylori* in childhood has not been studied. The main sources of exposure to ETS in childhood are the children's parents. The aim of this paper was to assess the relation between parental smoking and *H. pylori* infection in a large population sample of preschool children in Germany.

Subjects and Methods

Study Design and Study Population

In Germany, school attendance is mandatory, and all children who are to attend school for the first time are examined for school fitness by physicians of the public health service. We conducted a cross-sectional study among 1,201 preschool children living in Ulm, a city of about 100,000 inhabitants located in the south of Germany, who were examined for school fitness by the public health service in 1996. Details of the study design have been reported elsewhere.[10]

Data Collection

Active infection status was determined by a ^{13}C-labeled urea breath test. First, an initial breath sample was collected in a plastic bag. The children then were given 200 ml of apple juice (pH 2.2–2.4), which contained 60 mg of nonradioactive labeled ^{13}C-urea (Mass Trace, Woburn, MA). Thirty minutes later, a second breath

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