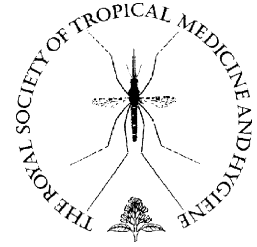




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## CORRESPONDENCE

### Diet as a factor in unexpectedly low prevalence of *Helicobacter pylori* infection

We recently described an unexpectedly low prevalence of *Helicobacter pylori* infection in a tropical African population, finding that only 17.5% of women attending antenatal care clinics on Pemba Island, Zanzibar, were infected (Frag et al., 2007). We also reviewed previous research that showed unexpectedly low prevalence of infection in Malaysia and Indonesia. An unexpectedly low prevalence has also been reported in Sri Lanka (de Silva, 1999; Devanarayana et al., 2008; Fernando et al., 2001). As Uyub and colleagues suggest in their letter in this issue of *Transactions*, the epidemiological evidence points to one or more extrinsic factors. Host and pathogen-specific factors are unlikely to be relevant because the populations of Zanzibar, Malaysia, Indonesia and Sri Lanka are not isolated and have long been exposed to genetic contributions and colonising gut bacteria of other populations.

In developed countries, the prevalence of *H. pylori* has been decreasing steadily over time owing to better sanitation and widespread use of antibiotics during childhood. Research in the USA showed that 9% of children <10 years old had used  $\beta$ -lactam antibiotics within the previous month (Chen and Blaser, 2008). Monotherapy with a variety of common classes of antibiotics can result in *H. pylori* treatment rates of 10–50% (Peterson et al., 1993), meaning that clearance of *H. pylori* infection can occur co-incidentally with treatment for other common conditions such as otitis media.

Just as antibiotics are the extrinsic factor probably causing a low prevalence of *H. pylori* infection in developed countries, we speculate that a dietary extrinsic factor, namely cloves (flower buds of the tree *Syzygium aromaticum*; syns. *Eugenia caryophyllus*, *E. aromaticum*, *E. caryophyllata* and *Caryophyllus aromaticus*), is contributing to the low prevalence of infection in Indonesia, Malaysia, Sri Lanka and Zanzibar. Indonesia and Malaysia combined produce 72% of the world's crop of cloves (Food and Agriculture Organization of the United Nations, 2004). Sri Lanka and Zanzibar, respectively, produce 8% and 29% of the remaining crop. The essential oil of cloves and its major ingredient (eugenol) have potent in vitro antibiotic activity against *H. pylori* (Li et al., 2005).

On Pemba, Zanzibar, most people handle cloves as seasonal clove pickers, processors and consumers. The buds are picked by hand then spread out to dry on mats around the

home. Cloves are often used to flavour spiced tea, which most people drink several times a day, or to flavour rice dishes and are sometimes held in the mouth and chewed. Poor unemployed rural families commonly find work as seasonal clove pickers. This corresponds with our findings of a lower prevalence among those using inexpensive household lighting (14.6% vs. 27.7%) and those living along the rural secondary road (10% vs. 25%) (Frag et al., 2007).

There is almost complete overlap between areas where an unexpectedly low prevalence of *H. pylori* infection has been reported and the areas of highest worldwide production of cloves, a common ingredient in food and drink that has potent in vitro antibiotic and antimicrobial activity against *H. pylori*. However, the role of cloves in altering the epidemiology of *H. pylori* infection in Zanzibar and other clove-producing countries is purely speculative at this point. To our knowledge, cloves have not yet been demonstrated to have anti-*Helicobacter* properties in humans, nor have any epidemiological studies been conducted to demonstrate an association. Epidemiological studies should be conducted to determine the population distribution of infection and to measure all factors that could be associated with infection, such as geographic location, bacterial virulence factors, hygienic practices, antibiotic use and dietary factors. Such a study should take place not just in Zanzibar but also in the clove-producing regions of Indonesia, Malaysia and Sri Lanka, as comparative evidence would be most informative.

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