

Review Articles

Transmission of Helicobacter Pylori: A Mystery of Nature

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Introduction

Helicobacter pylori is a small, highly motile, gram-negative bacillus. It is one of the commonest bacterial pathogen in human being¹. There is a causal relationship of this small spiral organism to gastritis, peptic ulcer, lymphoproliferative disorder and gastric cancer²⁻⁵. *H. pylori* infects at least 50% of world's human population⁵. In developed countries, overall prevalence of infection in young children is under 10% but up to 50% of children living in poor socioeconomic conditions of developed nation is infected. On the other hand in developing countries up to 80% children under 10 years are infected⁶. Prevalence infection is higher in later age group both in developed⁷ and in developing countries^{8,9}. Infection is mainly acquired in childhood⁶. Poor socio-economic condition is regarded as main risk factor for developing infection. Many questions remained unanswered regarding this organism. Our present understanding remains cloudy and incomplete regarding transmission of this infecting agent. The review is written to orient health personnel specially clinicians regarding mode of transmission of such infection.

Transmission of Helicobacter pylori

Despite the large volume of research on *Helicobacter pylori*, important epidemiological questions, such as how infection is transmitted, clearly remain unanswered. The fastidious nature of the organism, which makes culture difficult and the lack of accurate stereotyping system have hindered such studies⁶. The only consistent source of *Helicobacter pylori* is the gastric mucus of human being and some non-human primate. An environmental source of infection has not been identified. But person-to-person spread, seems to be the most likely mode of transmission. Evidence that supports person-to-person transmission is clustering of *Helicobacter pylori* infection in families and in institutions for the mentally handicapped. So, a common environmental source cannot be ruled out¹⁰.

A study of transmission pathways for *H. pylori* among a socioeconomically deprived Colombian community

with 90% prevalence of this infection in children did not implicate a single mode of transmission¹¹. The study suggests that transmission of infection is from older to younger siblings. However, the possibility of parent-to-child transmission cannot be ignored because 61% of first-born children were infected, as were 63% children with no other siblings. The work pointed out that the risk factors for infection are difficult to detect¹¹.

H. pylori is a microaerophilic organism that produces large amounts of urease, which enables it to survive in the acid environment of the stomach¹². Possible routes of person-to-person transmission are faecal to oral, oral-to-oral or gastric to oral¹². In animal studies *H. mustelae* has been detected in the faeces of infected ferrets when gastric pH was increased by administration of Omeprazole, but not when gastric acid secretion was normal¹³. Hypochlorhydria occurs in association with acute *H. pylori* infection in human beings, so perhaps young children shed the bacteria in faeces during the acute phase of infection. However, if faecal-to-oral transmission is common, then there should be outbreaks of infection associated with contamination of water supplies, but there is no evidence of such link⁶. *H. Pylori* has been cultured from water in limited number of studies³. Till that it is considered, *H. pylori* is transmitted mainly through faeco-oral route in developing countries and gastro-oral route in developed countries^{1,5}. The complexity of the oral flora is a major drawback in attempts to isolate *H. pylori* from the oral cavity. The organism has been cultured from saliva and from dental plaque, but only occasionally. Evidence against oral-to-oral transmission is that the prevalence of infection is not increased among teenagers, and that, in couples, *H. pylori* does not seem to be spread by the oral route. Furthermore, although the prevalence of infection is higher than expected among gastroenterologists, it is not among dentists, which suggests that exposure to oral secretions is not a risk factor for infection⁶.

Gastric-to-oral transmission has been postulated in young children, among whom vomiting and gastroesophageal reflux is common. Recently *H. pylori* from vomitus of a 6 year old child were isolated¹⁴. The vomitus could act as a medium of transmission.

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Vector transmission also has been suggested, and it is biologically possible because the midgut of the housefly (*Musca domestica*) has a pH of 3.1 and may thus provide an ecological environment for *H. pylori*¹⁵.

Studies on reinfection after treatment for *H. pylori* are also informative in relation to transmission. Adults rarely become reinfected after successful treatment. Children aged over 5 years have a re-infection rate 2% per year, which is similar to that for adults¹⁶. This rate is low, especially because the children were exposed, after treatment, to high prevalence of infection in their families, with 65% of siblings and 75% of parents being infected. The question arises as to whether this low reinfection rate is due to immune protection or whether these children aged over 5 years and adults are no longer at risk of infection. Evidence of immune protection against *H. pylori* has not been reported. In fact, despite mounting a vigorous immune response to *H. pylori*, the host is unable to eliminate the infection.

The transmission of close-contact infection depends on the degree of mixing between susceptible and infected individuals, also on the degree of crowding and age- distribution among those susceptible to infection and those infected⁶. Improvement in sanitary habits with increasing age may be an explanation for low reinfection rates, but the change in degree of contact between family members as children grow up may also be important in reducing the exposure to infection. The low rate of reinfection in children aged over 5 years suggest that child-to-child transmission is an important route of transmission of *H. pylori* infection.

Key Messages

- Helicobacter pylori infection is mainly acquired in childhood.
- How infection transmits till not clearly understood.
- Person-to-person transmission seems to be most likely mode of transmission.
- Transmission of infection from older to younger siblings is suggested.
- Parents to child transmission cannot be ignored.
- Faeco-oral route in developing countries and gastro-oral route in developed nations are mainly considered for transmission of infection.
- Poor socioeconomic condition and overcrowding are regarded as main risk factors for *H. pylori* infection.

Conclusion

Helicobacter pylori is one of the most common bacterial infection in human being. Transmission of infection is not understood clearly. Person to person transmission seems to be most likely mode of transmission. Prospective studies are required for a full understanding of such epidemiology which might help to formulate a preventive measure of such common infection.

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