

HEAD LICE AS VECTORS OF DISEASE

**Review of Papers Submitted by
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I believe that the head louse, *Pediculus capitis*, is a potential vector of louse-borne diseases. My opinion is based on a review of the submitted papers from the National Pediculosis Association, my own field experience with human lice in Ethiopia and Peru and discussions on the subject with Professor James R. Busvine of the London School. It has yet to be proven that head lice do not transmit disease. There is, however, laboratory evidence that they are susceptible to infection with *Rickettsia prowazeki* and subsequently become infectious. It is time now, therefore, to ensure that cautionary statements are included regarding head lice whenever human lice and louse-borne diseases are discussed.

I have summarized the papers below by category: laboratory studies, field investigations and general references.

Laboratory Studies

Transmission of typhus by body lice was demonstrated by Nicolle in 1909 and confirmed many times by subsequent studies. Later in 1920, Nicolle stated that head lice were also able to transmit typhus. Goldberger and Anderson (1912) successfully transmitted typhus to monkeys by cutaneous injection of infected, crushed head lice. In 1952, Weyer reported that *Rickettsia prowazeki* and *R. quintana* could proliferate in the head louse. Two years later, Mooser and Weyer found that the spirochetes of relapsing fever could reproduce in the head louse. Most recently, Murray and Torrey (1975) at the Harvard School of Public Health, demonstrated that head lice were highly susceptible to *R. prowazeki* and that the organisms appeared in their feces.

Field Investigations

Foster stated that head lice may have been responsible for an outbreak of typhus in the Philippines in 1915. Two years later, Haight, suggested that a typhus case in Toronto, Canada could have been transmitted by a head louse. Gathe (1932) investigated an outbreak of typhus in Malaya and reported head lice to be prevalent. He was unable, however, to find any body lice. In 1938, Bequaert stated that head lice were responsible for an outbreak of typhus in Guatemala. In the same year, Castandea reported that head lice were the vectors of typhus in Mexico. During World War II, Gear (1973) investigated a typhus epidemic in the Transkei where he found both head and body lice harboring the infection. In Yugoslavia, Gaon (1973) reported that both head and body lice were found in large numbers in louse-borne disease epidemics. He noted that there was never a case when only head lice were observed, even though 5-10% of the population might have been infested. However, he stressed that, as body lice disappear, considerable importance must be attached to head lice as vectors of disease. Boyle (1987, Family Practice 4:138-42) studied the prevalence of head lice in Saudi Arabian children and concluded the problem should be viewed as much more than just a nuisance. He stated that, "As the head lice is known to spread several viral and rickettsial diseases, such as relapsing fever and typhus, greater efforts should be made towards patient education in hygiene, and towards

identifying and treating the disease when found."

General References

Nicolle (1920) claimed head lice could transmit typhus. Mackenzie (1942) believed that body lice were evolutionary forms of the head louse and that both were vectors of typhus. Gerberg suggested in 1973 that there is a potential hazard for disease transmission by head lice in urban areas. Maunder (1983) wrote that while all three species of human lice were potential vectors, the body louse was most important because it is found in large numbers and their feces are more likely to be trapped in the clothing. Weidhaas and Gratz noted in a 1982 WHO publication that head lice may act as vectors but are not responsible for louse-borne disease outbreaks in the absence of body louse infestations.

The following general reference texts state that one or more louse-borne diseases are transmitted primarily by body lice: 1992 Conn's Current Therapy, Communicable Disease in Man-1990, 1991 Report of the Committee on Infectious Diseases, Principles and Practice of Infectious Diseases, 3rd Ed., 1990, Current Diagnosis and Management by Laboratory Methods--1991, Rudolph's Pediatrics, 19th Ed., 1991, Tropical and Geographical Medicine--1990 and Textbook of Pediatric Infectious disease--1987. Both head and body lice were considered to be capable of transmitting diseases by Buxton (as stated in his 1935 classic book, The Louse) but that the head louse was infrequently associated with epidemics. This viewpoint is stated in the 1988 edition of Microbiology. Felsenfeld in his book (1971) on relapsing fever stated that both head and body lice were vectors of louse-borne relapsing fever.

Comments

One thing is very clear in a review of this literature--the question of head lice as disease vectors has not been resolved. Unfortunately, unequivocal comments made regarding head lice in many of our standard reference texts (i.e., Conn's Current Therapy, Communicable Disease in Man) are based on earlier published remarks and not new evidence. Results from field studies have been unreliable because they are often based on casual observations and not on well-designed studies, laboratory confirmations and intensive data collection. Results from the few laboratory studies conducted remain inconclusive as direct transmission to humans has yet to be demonstrated.

Lice and the louse-borne diseases have received relatively scant attention in the past and are under very limited investigation now. I doubt that conclusive evidence will be obtained soon that reveals the definitive role of head lice as disease vectors. The head and body lice are two closely related ectoparasites inhabiting the different parts of the same host as is found in certain species of bird lice. They are closely related (some authors consider them sub-species), are both active blood-feeders and, not surprisingly, their biology and morphology are very similar. They do differ, however, in their behavior, longevity, hardiness and fecundity. The body louse produces up to 300 eggs, can live 10 days or more off the body, proliferates rapidly and disseminates quickly. Head lice have a lower fecundity rate, are less hardy, occur in lower numbers than body lice and are primarily limited to the younger ages. It seems logical to assume that body lice would more likely initiate and sustain an epidemic of louse-borne disease. However, laboratory studies have shown that typhus casual organisms will infect the head louse and that they subsequently become infectious (i.e., casual organisms appear in the feces). Perhaps, therefore, the question is not whether they are vectors of human disease but how strong the casual relationship is.

Classically, the bed bug has been considered unable to vector disease even though it is an eloquent human ectoparasite. Only recently has it been incriminated as a vector of hepatitis B virus in Senegal, the Gambia and South Africa. To me, it seems illogical if not arrogant to state flatly, as many authors and references have, that head lice are not potential vectors of disease. To continue labeling them as such is a disservice to future epidemiological investigators that may discount them as a mere nuisance and ignore them in future epidemiological investigations of disease outbreaks. It is time now to change our "paradigm" about head lice and human disease.

***Note:** The National Pediculosis Association is a non-profit health agency established to build awareness about head lice and to standardize head louse control policies nationwide. I have had a close association with NPA for several years, and the organization has grown to become one of the Nation's leaders in public health education. To their credit, NPA recognizes a broad base of health risk to people who acquire head lice, including the hazards to children by abuse and misuse of pesticidal treatments. In addition, NPA has been particularly effective in their efforts to dispel myths about pediculosis. They have done this by encouraging objective and scientific reviews of the accuracy of information as it is reflected in currently utilized medical literature and procedures.

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