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Oral Wounds and Hepatitis B Virus Transmission

To the Editor—Sharing toothbrushes is commonly considered a risk factor for hepatitis B virus (HBV) infection.[1] However, sharing eating utensils and drinking glasses and kissing are dismissed as risks.[1] Does the act of sharing drinking glasses or kissing not carry a viral transmission risk if the persons involved have open oral wounds?

Open wounds are the primary route of HBV infection. Thus far, however, none of the experimental studies that have examined the oral infectivity of HBV in primates have included the creation of oral wounds in their experimental designs. Without the inclusion of oral wounds, the reported animal studies on the oral infectivity of HBV may be compared with tests of HBV infectivity through the skin in the absence of skin wounds.

Similarly, clinical observation studies on oral infectivity have examined the normal situation but not the uncommon situation of having open oral wounds. Investigations of infection sources and contact tracing have been based on commonly recognized infection routes but have not paid attention to whether there were oral wounds present during the suspected infectious stage. Furthermore, there has been no discussion found in the scientific literature on the role of oral wounds in HBV transmission.

Many aspects of epidemiology regarding HBV remain unknown. For example, the identifiable risk factors are unclear for over one-third of patients with acute HBV infection.[2] Although HBV may attach to and infect a few types of human cells (hepatocytes, fibroblasts, peripheral blood mononuclear cells, and the plasma membranes derived from the 2 cell types),[3,4] the human oral mucosa does not contain targets for HBV attachment and infection. We propose that open oral wounds can be a route to mediate HBV transfer while kissing or sharing drinking glasses, eating utensils, or food. This hypothesis explains many of the long-standing questions regarding HBV epidemiology.

Why is there a steep increase in HBV prevalence among children who have not been exposed to any known routes of infection?[5] We explain that children often share drinking glasses, dinnerware, or food with family members, thus increasing the risk of HBV transmission via oral routes.

Why does HBV infection show intrafamilial clustering?[6] We propose that one possible mechanism is that it is more common for family members to share drinking glasses, dinnerware, or foods with each other.

A study involving patients with various types of oral diseases who were admitted to hospitals for surgery showed that hepatitis B surface antigen levels were much higher in patients with benign oral tumors than in patients with 6 other oral diseases (teeth impactions, jaw deformities, oral cancers, oral

inflammations, oral cysts, and oral traumas).[7] These 7 oral disease categories frequently cause wounds and bleeding. However, according to our poll of clinical oral physicians, patients usually get rid of the 6 oral diseases other than benign oral tumors much sooner, allowing for the increased risk of HBV infection through associated open wounds.

HBV prevalence in Southeast Asia and Africa is 8%–20%, markedly higher than that in Western Europe, North America, and parts of South America (<2%).[8] Notably, the eating styles are very different in these 2 sets of regions. In Southeast Asia and Africa, individuals use utensils or their hands to transfer food from common vessels shared with others at the table to their mouths. In this style of eating, each individual's saliva or bloody saliva (due to oral wounds) easily contaminates the shared food and is transferred among the diners. This increases the risk of HBV transmission via oral routes. In contrast, in Western Europe and North American, the dominant eating style involves dividing the food into separate portions and using personal utensils or hands to transfer food from the separated portion to the mouth.

Why is HBV prevalence much higher in rural areas of South Africa than in urban areas?[9,10] The living style of Africans in the urban areas of South Africa has been greatly influenced by Western practices. The common African eating style remains much more prevalent among the rural population.

The hypothesis of oral wounds as portals explains many additional unexplained issues regarding HBV epidemiology. Are these reasonable explanations mere coincidences?

The following factors may make oral wounds a more effective route of HBV transmission: (1) oral wounds occur more frequently compared with other type of wounds due to various causes (eg, cysts, benign tumors, ulcers, bite injuries, injuries due to toothbrushing); (2) oral wounds are exposed to HBV via frequent daily activities (eg, kissing or sharing dinnerware, drinking glasses, or food).

Future animal studies on oral HBV transmission should include the creation of oral wounds in the protocol. The results could still be negative if oral wounds were inflicted, because the animal's receptivity to HBV might be significantly lower due to host specificity of HBV or other factors. Thus, urgent clinical studies with attention to oral wounds are required.

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