

# PRACTICE FORUM

## Body piercing as a risk factor for viral hepatitis: An integrative research review

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The relationship of viral hepatitis and body piercing has been investigated in 12 research studies published between 1974 and 1997. Because there are often a large number of unknowns regarding the cause of viral hepatitis, most of the studies were conducted to identify multiple risk factors for hepatitis. Eight of the 12 studies identified percutaneous exposure, including body piercing and ear piercing, as a risk factor for viral hepatitis. Six studies found that hepatitis seropositivity was significantly associated with ear piercing. Conclusions indicate that evidence is sufficient to institute public health education along with regulation of the body-piercing industry. Recent research has found a significant increase in legislative efforts to regulate body piercing. Little research has focused directly on body piercing as a specific risk factor for viral hepatitis. Further research in this area is necessary to increase the understanding of hepatitis transmission by body piercing. (*Am J Infect Control* 2001;29:271-4)

Body piercing appears to be growing in popularity and social acceptance. The Centers for Disease Control and Prevention (CDC) has published several documents regarding the risk of HIV and hepatitis infection related to body piercing.<sup>1,4</sup> Multiple research studies have concluded that body piercing is a risk factor for hepatitis infection.<sup>5-12</sup> Two states reported HIV and/or hepatitis infection related to body piercing in a recent nationwide survey.<sup>13</sup> One of the states specified hepatitis infection. The only published data available regarding regulation of the body-piercing industry report that 3 states impose regulations.<sup>14</sup> Of the 78% of the states that responded to a nationwide survey regarding regulation of the body-piercing industry, 40% currently impose regulations and 58% have passed legislation to regulate the body-piercing industry.<sup>13</sup> This indicates a recent increase in efforts to regulate the body-piercing industry.

Viral hepatitis is a major infectious disease causing considerable morbidity and mortality throughout the world. The virus resides in chronic asymptomatic car-

riers who become susceptible to debilitating, potentially fatal, liver disease. The World Health Organization estimated that there are more than 200 million chronic asymptomatic carriers of hepatitis B virus (HBV) worldwide.<sup>15</sup> The World Health Organization estimates that globally 170 million persons have hepatitis C virus (HCV) infection.<sup>16</sup> Estimates of chronic asymptomatic carriers of HCV in the United States may be as high as 3.5 million.<sup>17</sup> It is estimated that 32.3 million persons have infection in Southeast Asia, 31.9 in Africa, and 8.9 in Europe.<sup>16</sup> Both HCV and HBV are parenterally acquired diseases that have a high rate of chronicity, which can result in chronic liver disease, cirrhosis, and hepatocellular carcinoma.<sup>10,17</sup> Non-A, non-B hepatitis (NANB) also has been associated with parenteral transmission. Research has identified HCV as a causative agent for NANB hepatitis.<sup>17</sup> This review classifies NANB hepatitis, HBV, and HCV separately.

### SAMPLING AND METHODS

All of the research studies in this review were completed between the years 1974 and 1997. Four of the 12 studies were conducted in Italy by the same investigator.<sup>7-9,19</sup> Three studies were done in the United States,<sup>5,11,12</sup> 2 in Taiwan,<sup>20,21</sup> and 1 each in Africa,<sup>6</sup> Korea,<sup>22</sup> and Bangkok.<sup>10</sup>

All 12 studies were nonexperimental designs that used interviews and questionnaires for data collection. Many of the interviews were performed by public health officials, physicians, or study teams.<sup>7-9,20,21</sup> Eight research studies were case-control designs,<sup>5,8,9,11,19-22</sup> with 1 prospective<sup>12</sup> and 3 cross-sectional designs.<sup>6,7,10</sup>

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**Table 1.** Chronologic summary of research of viral hepatitis related to body piercing

Author	Research topic	Sample	Research design	Data collection	Results
Johnson et al, <sup>5</sup> 1974	Ear piercing and hepatitis in the United States	48 Viral hepatitis cases with no previous exposure with 100 hepatitis negative control cases	Case-control	Telephone interview	Risk related to ear piercing, $P < .001$
Karim et al, <sup>6</sup> 1988	Transmission of HBV infection in Africa	Statistically selected urban (805), rural (238), and institutionalized (127) children	Cross-sectional	Questionnaire and examination	Risk related to ear piercing, $P < .001$ ; risk related to scarification, $P < .05$
Mele et al, <sup>8</sup> 1990	Prevention of HBV in Italy	2460 HBV-positive cases with 708 HAV positive control cases	Case-control	Interview and questionnaire	Risk related to percutaneous exposure, OR = 2.7; 95% CI, 1.38-5.24
Mele et al, <sup>7</sup> 1990	Decline in A, B, and NANB hepatitis in Italy	7271 acute viral hepatitis cases	Cross-sectional	Interview and questionnaire	Risk related to percutaneous exposure, HBV = 47%, NANB = 43%
Mele et al, <sup>9</sup> 1994	Risk factors for NANB hepatitis in Italy	333 NANB cases with 1095 hepatitis negative control cases	Case-control	Interview and questionnaire	HCV-related percutaneous exposure, OR = 1.7; 95% CI, 0.5-6.0
Chen et al, <sup>20</sup> 1995	Injection with nondisposable needles as route for HCV in Taiwan	38 HCV-positive cases with 76 HCV-negative control cases	Case-control	Interview and questionnaire	Risk related to ear piercing, not significant

Many of the case-control studies used age- and sex-matched control groups.<sup>8,9,20-22</sup> The studies focused on the type of hepatitis as follows: HBV (3 studies)<sup>6,8,10</sup>; HCV (6 studies)<sup>11,12,19-22</sup>; HBV and HCV (2 studies)<sup>7,9</sup>; and unspecified viral hepatitis (1 study).<sup>5</sup> The studies ranged from sample sizes of 114 to 7271 cases. Table 1 provides an overview of the research topics, samples, methodologies, and results.

The primary purpose of each study was to identify risk factors for viral hepatitis because a large number of cases of hepatitis have unknown etiology. One study specifically evaluated ear piercing as a possibility of hepatitis transmission.<sup>5</sup> Eleven of the studies used the standard serologic markers of hepatitis, which include radioimmunoassay and enzyme immunoassay. The study conducted by Johnson et al<sup>5</sup> did not specify the testing used or the type of hepatitis identified. This may be a result of the scientific knowledge that was available in 1974. The 6 studies that focused on HCV

used confirmatory tests. The specific tests included RIBA-2,<sup>11,19,20</sup> third-generation immunoblot assay,<sup>12</sup> and second-generation enzyme immunoassay with recombinant HCV capsid.<sup>20,21</sup> Standard statistical software was used for statistical analysis in many of the studies.<sup>9,11,20-22</sup> Seven studies used multiple logistic regression to estimate odds ratios or  $P$  values.<sup>8-12,20,22</sup> Sample size and selection was typically all of the patients with either HBV, HCV, or NANB hepatitis during a specified period. Exclusion of patients with hepatic injury or disease, intravenous drug abuse, or blood transfusion was a common factor in a few studies.<sup>9,19-21</sup> Informed consent was explicitly addressed in 6 of the research studies.<sup>6,11,12,20-22</sup> Limitations of the research were addressed in several of the studies.<sup>8,9,22</sup>

## ANALYSIS

Ear piercing was significantly associated with hepatitis in 6 of the research studies,<sup>5,6,9-12</sup> 3 of which

**Table 1.** Continued

Mele et al, <sup>9</sup> 1995	Beauty treatments and risk of hepatitis in Italy	6395 HBV-positive and 2558 NANB-positive cases with 4789 HAV-positive control cases	Case-control	Interview and questionnaire	Risk related to ear piercing, HBV: OR = 2.2, 95% CI, 1.51-3.22; NANB: OR = 1.57, 95% CI, 0.95-2.5
Luksamijarulkul et al, <sup>10</sup> 1995	Risk factors for HBV in school-aged children in Bangkok, Thailand	165 children without HBV vaccination, 41 with HBV seromarkers, and 124 without seromarkers	Cross-sectional	Interview and questionnaire	Risk related to ear piercing in females, $P < .007$
Li et al, <sup>21</sup> 1996	Risk factors for HCV in Taiwan	161 positive cases with 161 HCV negative control	Case-control	Interview and questionnaire	Risk related to ear piercing not significant cases
Conry-Cantilena et al, <sup>11</sup> 1996	Routes of infection in HCV positive blood donors in the United States	248 HCV-positive cases 102 with indeterminate results, 131 HCV-negative cases	Case-control	Medical history and questionnaire	Risk related to ear piercing in males, $P < .05$
Kim et al, <sup>22</sup> 1996	Risk factors of HCV among Koreans	64 HCV-positive cases with 128 HCV-negative control cases	Case-control	Self-administered questionnaire	Risk related to ear piercing not significant, OR = 1.5 (CI not available)
Alter et Al, <sup>12</sup> 1997	HCV in asymptomatic blood donors in the United States	248 HCV-positive blood donors	Prospective	Interview	Risk related to ear piercing in males, $P < .05$

were conducted in the United States.<sup>5,11,12</sup> Two studies found percutaneous exposure, which included body piercing, to be a risk factor for hepatitis infection.<sup>7,8</sup>

Four of the research studies did not find body piercing to be a risk factor for hepatitis infection.<sup>20-22</sup> Those studies had smaller sample sizes. Two studies did identify injection with nondisposable needles as a significant risk factor for HCV infection.<sup>20,18</sup> Use of reusable piercing devices or unsterile needles is a possible route of hepatitis infection with unregulated body piercing.<sup>23</sup>

Recommendations from the studies that found body piercing to be a risk factor for viral hepatitis included the following: (1) public education regarding the risk factors associated with viral hepatitis<sup>6,10,21</sup>; (2) regulation of the body piercing industry<sup>5</sup>; (3) use of single-use, sterile devices or proper sterilization techniques for body piercing<sup>5,6,8,9,20,21</sup>; and (4) HBV vaccination.<sup>6-8,10</sup>

## DISCUSSION

Despite the limited amount of research regarding body piercing as a risk factor for viral hepatitis, data are sufficient to conclude that it is a risk for the spread of this disease. The CDC has published several documents regarding the risk of hepatitis and HIV infection related to body piercing.<sup>1,4</sup> Legislative efforts to regulate the body piercing industry have recently increased.<sup>13</sup> The National Environmental Health Association developed a *Body Art Model Code and Guideline* in December 1997 to assist states in regulating body piercing.<sup>24</sup> Forty-two percent of the states that have become involved in body-piercing regulations have used the code to develop their rules and regulations.<sup>13</sup> The state of New Hampshire enacted legislation in January 2000 that requires use of single-use, sterile devices for ear piercing only.<sup>25</sup>

The need for further research focused directly on body piercing as a risk factor for viral hepatitis is a conclusion of this research review. Public health education regarding risk factors for viral hepatitis and regulation of the body-piercing industry are also indicated based on this review.

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