Hepatitis C virus (HCV) infection shows clear differences in prevalence among geographic regions, according to World Health Organization data (1). HCV prevalence also varies over time and with behavioral changes (2,3). HCV prevalence in the People’s Republic of China nationwide was estimated at 3.2% in a 1992 survey (prevalence in the People’s Republic of China nationwide reported regional prevalence rates ranging from 0% to 31.9%), but studies have reported regional prevalence rates ranging from 0% to 31.9% (5–7). In developing countries, transmission of HCV typically results primarily from iatrogenic factors, such as blood transfusion and inadequate sterilization or reuse of medical equipment (8), but in industrialized countries, risk resulting from these factors has been greatly reduced (9,10).

In an esophageal endoscopic survey (2006–2008) in Anyang, Henan Province, China, blood screening for the HCV antibody was carried out in all participants. Because HCV infection is an important public health issue, a case–control study was performed among HCV-positive case-patients with matched controls to evaluate risk factors for HCV infection in the area where the esophageal endoscopic survey was conducted.

The Study

An endoscopic survey (2006–2008) for esophageal cancer was conducted in 8 villages of 4 counties of China; 8,226 residents 25–65 years of age in 4 counties of China; virus prevalence was 0.9%. A subsequent case–control study indicated blood transfusion (odds ratio [OR] 4.55), esophageal balloon examination (OR 3.78), and intravenous injection (OR 5.83) were associated with infection.

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Univariate conditional logistic regression was used to evaluate possible risk factors based on information collected from the 69 HCV-positive participants and 207 matched controls. Transfusion with blood and blood products, intravenous injection, and procedures including Caesarean section, acupuncture, gastroscopy, and esophageal balloon examination were associated with higher risk for HCV infection. No instances of hemodialysis, organ transplantation, drug use, or homosexual behavior were identified. However, when these risk factors were analyzed in a multivariate model, only blood transfusion (odds ratio [OR] 4.55, 95% CI 1.34–15.42), intravenous injection (OR 5.83, 95% CI 2.66–12.80), and esophageal balloon examination (OR 3.78, 95% CI 1.32–10.79) were significant (Table 2). A repeat analysis of participants from Lin County produced almost identical results (data not shown).

Conclusions

In this 2006–2008 study, overall HCV prevalence was 0.9%, with prevalence highest in the ≥50-year-old group of Lin County (4.7%). In a 2000 study of 55- to 84-year-old Lin County residents, the prevalence of HCV was 9.6% (7). Several possible reasons could explain these differences. One is that the average age in the previous study (range 64–84 years) was greater than that in our study (range 25–65 years); older persons were more likely to be infected in both the previous study and our study. The time interval between these 2 studies might also have contributed to the change in HCV prevalence.

A case–control study was performed to identify HCV infection risk factors. Blood transfusion and medical intravenous injection with reusable glass syringes and needles, which are established HCV risk factors, were associated with HCV infection (10,11). In addition, esophageal balloon examination, a less commonly identified route of HCV infection, also increased the risk for HCV infection. In the recent past (1980–2000), esophageal balloon examination, which was designed for early cytologic detection of esophageal cancer, was performed on more than 80% of the population in the study area. The overall prevalence of HCV was 0.9%, which was lower than in other areas in China.

Table 1. Demographic distribution and HCV infection status of participants (n = 8,226) in an esophageal endoscopic survey for HCV, Anyang, China, 2006–2008*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total no. (%)</th>
<th>HCV-positive, no. (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>5,766 (70.1)</td>
<td>37 (0.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&gt;50</td>
<td>2,460 (29.9)</td>
<td>37 (1.5)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3,782 (46.0)</td>
<td>31 (0.8)</td>
<td>0.479</td>
</tr>
<tr>
<td>F</td>
<td>4,444 (54.0)</td>
<td>43 (1.0)</td>
<td></td>
</tr>
<tr>
<td>County</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hua</td>
<td>4,022 (48.9)</td>
<td>7 (0.2)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Anyang</td>
<td>838 (10.2)</td>
<td>6 (0.7)</td>
<td></td>
</tr>
<tr>
<td>Lin</td>
<td>1,980 (24.1)</td>
<td>55 (2.8)</td>
<td></td>
</tr>
<tr>
<td>Tangyin</td>
<td>1,386 (16.8)</td>
<td>6 (0.4)</td>
<td></td>
</tr>
</tbody>
</table>

*HCV, hepatitis C virus.
of esophageal lesions, was relatively common in China for diagnosis and screening of persons in high-risk populations (12). In this technique, the patient swallows a balloon covered with a cotton net. The balloon is inflated within the patient’s stomach. Exfoliated esophageal cells are then scraped off the mucosa by pulling out the balloon. Bleeding of esophageal mucosa can occur. The balloon and cotton net were designed to be nonreusable. Nonetheless, on some occasions, balloons were reused after manual cleaning. This technique is no longer widely used; however, Lin County is a high-risk area for esophageal cancer. Screening for esophageal cancer using balloon examination was performed in this region before 2000. Reuse of balloons and occasional bleeding during the procedure may have caused transmission of HCV in this population.

A nationwide survey for HCV infection in China was performed in 1992; prevalence was 3.1% for residents in rural areas. However, prevalence of viral infection was not consistent across regional populations, similar to what was observed in the present study (4). On the basis of these regional differences in HCV distribution and the potential risk factors identified in this study, we strongly suggest that unregulated medical procedures may confer substantial risk for HCV spread.

Chronic infection will develop in ≈75%–85% of persons infected with HCV, and cirrhosis of the liver will develop in up to 20% of chronically infected persons. Hepatocellular carcinoma will develop in ≈3%–4% of patients with HCV-associated cirrhosis each year (13–15). Given the serious social and economic effect of this HCV epidemic, strengthening administrative regulation of medical practice, especially in rural areas, and providing appropriate education to the public about HCV infection and its transmission should be given higher priority in public health policy.

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Ms Liu is a PhD candidate at Peking University School of Oncology. Her research interests include viral infection and the etiology of esophageal cancer.

References


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