Association Between Seropositivity of Antibodies Against Helicobacter Pylori and Hepatitis A Virus

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Abstract

Background: Helicobacter pylori and hepatitis A virus are suggested to share common routes of transmission including feco-oral route. The aim of this study was to know whether it is true or not.

Method: Thirty hundreds and seventy four serum samples were obtained at random basis from healthy volunteers living in four urban and four rural areas of Sari township, and analysed for helicobacter pylori IgG antibody by enzyme linked immunosorbent assay. Hepatitis A virus antibodies were assayed by microparticle enzyme immunoassay in the same samples. The association between seropositivity of antibodies against helicobacter pylori and hepatitis A virus was examined for the statistical significance by Fisher’s Exact test. Multivariate adjusted Odds Ratios (ORs) with their 95% Confidence Intervals (CIs) were examined by multiple logistic regression analysis.

Results: The seroprevalences of helicobacter pylori and hepatitis A virus were approximately similar (33.1% and 20.5%). In this study 22.2% were seropositive for helicobacter pylori and hepatitis A virus antibodies at the same time (OR=0.01, P<0.05). There was a significant relationship between age and seroprevalences of helicobacter pylori (OR=0.72, P<0.05, 95% CI=0.3-0.6-0.73) and both microorganisms at the same time (OR=0.01, P<0.05). The seropositivity of Helicobacter pylori and hepatitis A virus and coincidence of both infections at the same time in females were higher than in males (P<0.05). Statistically significantly relationship was found between seropositivity of antibodies against helicobacter pylori, hepatitis A virus and the level of education (OR=1.69, P<0.05, 95% CI=1.4-3.51), (OR=0.89, P<0.05, 95% CI=0.37-0.93) as well as occupation (OR=1.6, P<0.05, 95% CI=1.25-2.64), (OR=1.9, P<0.05, 95% CI=1.8-2.37).

Conclusion: According to our findings there are some shared risk factors to acquire these two pathogens in Iran which indicates common modes of transmission.

Key words: Enzyme linked Immunosorbent Assay, Helicobacter pylori, Hepatitis A Virus.

Introduction

Helicobacter pylori infection is probably the most common chronic bacterial infection in human1. H pylori has been implicated as a major etiological factor in chronic type B gastritis, peptic ulcers and indirectly related to gastric adenocarcinoma and primary gastric B cell lymphoma2. The infection may be acquired in early life and personal contact in crowded living conditions during childhood play a important role in it's
transmission. Several methods of transmission for H. pylori have been proposed including feco-oral and oro-oral routes. In developing countries it is transmitted mainly by feco-oral; however, the emerging pattern of epidemiology of H. pylori infection seems very similar to that of Hepatitis A Virus (HAV). HAV is transmitted predominantly through the feco-oral route and has high incidence in population with poor hygiene practices and low socio-economic level. Since H. pylori is transmitted with feco-oral and oro-oral routes and HAV is known to be a sensitive marker of feco-oral exposure, HAV infection could be associated with an increased risk of H. pylori acquisition, then the association between these two infections requires further investigation. Indeed, similar age specific prevalence curves for H. pylori and HAV have been documented, suggesting a shared feco-oral transmission common for H. pylori and HAV.

The aim of this study was to assess the seroprevalence of H. pylori and HAV in a group of Iranian people in the North of Iran, to compare the relation of different risk factors including age, gender, level of education, occupation, source of water supply, place of residence and type of housing with these two pathogens and to investigate the association between seropositivity of antibodies against H. pylori and HAV which suggests similar modes of transmission of these two microorganisms including feco-oral route.

Materials and Methods

Totally, 374 serum samples were collected from healthy volunteers (239 from females, 135 from males, age range 3-81 years, mean and standard deviation of 34 ±16.7) participated in a health check program planned by Public Health Center of Mazandaran Province affiliated to Mazandaran University of Medical Sciences on 2002. Serum samples were obtained randomly from healthy volunteers living in four rural areas of Sari township and four districts of Sari city. At interview, questionnaire data including age, gender, place of residence (urban or rural), source of water supply (city of well), type of housing (single dwelling, multifamily dwelling or apartment), level of education (literate or illiterate) and occupation (employed or unemployed) were collected. Two last factors were used as surrogate for socio-economic status. In this study, subjects graduated form high school or with higher levels of education were considered literate and those graduated from primary school or with no schooling were considered illiterate. Serum samples were analysed for H. pylori IgG antibody by means of Enzyme Linked Immunosorbent Assay (ELIZA) using GAP-IgG Test (Biomerica, Newport Beach, CA). The procedures were performed according to the manufacturers instructions and the cut-off point was determined at 20 U/ml. Samples were considered positive for H. pylori antibody levels were more than 20U/ml and negative when they were less than 12.5 U/ml. The intermediate range was considered indeterminate for evaluating the seropositivity of H. pylori. Anti-HAV were determined and the relation between seropositivity of these two pathogens and different risk factors were examined.

Statistical analysis

The statistical significance of relation between seropositivity of anti-H. pylori and anti-HAV antibodies and different environmental factors and the significance of association between seropositivity of H. pylori and HAV were examined by Fisher’s Exact Tests. Odds ratios (Ors) with 95% Confidence Intervals (CIs) were also calculated to indicate the magnitude of the association. Multiple logistic regression analysis was used to derive multivariate adjusted OR and its 95% CI.

Results

In this study subjects below the age of 9 years, had lower seroprevalences of H. pylori and HAV as shown in figure 1. The frequency of H. pylori seropositivity showed a sudden increase in 10 to 19 and 20 to 29 year age groups and increased slowly up to 70 to 79 year age group then slightly decreased in the highest age groups. The age specific seroprevalence of HAV was similar to that of H. pylori with an exception that increase in the seroprevalence of HAV was slow for 10 to 19 year age group but suddenly increased at age group of 20 to 29 year reaching the highest level at the age of 80 and more. The coincidence of both infections at the same time showed the similar pattern. In univariate analysis a significant difference was found in the rate of anti-H. pylori seropositivity between subjects
### Table 1: Results of Logistic Regression Analyses

<table>
<thead>
<tr>
<th>Variables</th>
<th>Anti-H. pylori positive No (%)/No tested</th>
<th>P* Value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>Anti-HAV positive no (%)/No. tested</th>
<th>P* Values</th>
<th>Odds Ratio</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
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<tr>
<td>&lt;9</td>
<td>5(13.9)/136</td>
<td></td>
<td></td>
<td></td>
<td>6(16.7)/136</td>
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<tr>
<td>10-19</td>
<td>11(23.9)/146</td>
<td>0.12</td>
<td>0.93</td>
<td>0.57-</td>
<td>13(31.7)/142</td>
<td>&lt;0.05</td>
<td>0.42</td>
<td>0.36-</td>
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<tr>
<td>20-29</td>
<td>14(33.3)/42</td>
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<td></td>
<td></td>
<td>14(31.8)/44</td>
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<tr>
<td>30-39</td>
<td>16(36.4)/44</td>
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<td></td>
<td>19(32.2)/59</td>
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<tr>
<td>&gt;50</td>
<td>56(38.1)/147</td>
<td>0.05</td>
<td>0.62</td>
<td>0.12-</td>
<td>53(36.1)/147</td>
<td>&lt;0.05</td>
<td>0.42</td>
<td>0.36-</td>
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<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Males</td>
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<td>0.05</td>
<td>0.62</td>
<td>0.12-</td>
<td>27(20.1)/135</td>
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<td>0.42</td>
<td>0.36-</td>
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<td>Females</td>
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<td>87(36.3)/239</td>
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<td><strong>Place of Residence</strong></td>
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<td>Rural</td>
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<td>2.87</td>
<td>1.51-</td>
<td>45(26.8)/168</td>
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<td>0.64</td>
<td>0.24-</td>
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<td>Urban</td>
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<td>69(33.5)/206</td>
<td></td>
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<td><strong>Water Supply</strong></td>
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<tr>
<td>City</td>
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<td></td>
<td></td>
<td>49(21.1)/229</td>
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<tr>
<td>Well</td>
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<td>2.48</td>
<td>2.7-</td>
<td>65(44.8)/145</td>
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<td>0.35</td>
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<td>17.65</td>
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<td>46.32</td>
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<tr>
<td>Employed</td>
<td>31(20.0)/154</td>
<td>0.05</td>
<td>1.6</td>
<td>1.2</td>
<td>82(37.2)/220</td>
<td>&lt;0.05</td>
<td>1.23</td>
<td>1.8-</td>
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<td>Unemployed</td>
<td>93(42.2)/220</td>
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<td></td>
<td></td>
<td>82(37.2)/220</td>
<td>&lt;0.05</td>
<td>1.23</td>
<td>1.8-</td>
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<td><strong>Level of education</strong></td>
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<tr>
<td>Literate</td>
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<td>41(24.8)/165</td>
<td>&lt;0.05</td>
<td>0.89</td>
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<td>Illiterate</td>
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<td>73(35.5)/209</td>
<td>&lt;0.05</td>
<td>0.89</td>
<td>0.37-</td>
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<td><strong>Type of housing</strong></td>
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<tr>
<td>Single dwelling</td>
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<td></td>
<td></td>
<td>36(29.3)/123</td>
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<tr>
<td>Multifamily dwelling</td>
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<td></td>
<td></td>
<td>38(30.4)/125</td>
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<tr>
<td>Apartment</td>
<td>42(33.7)/126</td>
<td>0.31</td>
<td>0.72</td>
<td>0.37-</td>
<td>40(31.7)/126</td>
<td>0.06</td>
<td>2.56</td>
<td>1.47-</td>
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<td></td>
<td></td>
<td>0.89</td>
<td>0.06</td>
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<td>6.69</td>
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</table>
living in the city and those living in the rural areas (OR=2.87, P<0.002, 95% CI=1.51-5.43), however the difference between the level of anti-HAV seropositivity was not significant in rural and urban areas. The seroprevalences of H.pylori and HAV are higher in females than in males (P<0.05, P<0.05).

Table 1 shows the results of multiple logistic regression analysis with seropositivity of anti-H.pylori and anti-HAV and anti-H.pylori antibodies remained statistically significant after adjustment for age, gender, occupation and level of education (OR=0.43, P=0.003, 95% CI = 0.03, 95% CI=0.36-0.73). In overall, eighty three subjects (22.2%) were seropositive for both HAV and H.pylori at the same time (OR=0.01, P<0.05). The coincidence of both infections were 14.6% among subjects below the age of 20 years (P<0.05, 95% CI=0.08-0.38), 24.3% among adults, 21% in males and 23% in females. Fifty three subjects (14.2%) were seronegative for both HAV and H.pylori (OR=6.06, P<0.05, 95% CI=1.22-4.77).

Discussion
Acquisition of HAV and H.pylori infections are established early in life and most children have been infected by the time they reach late adolescence. Increase in the seroprevalence rates of anti-HAV and anti-H.pylori with age in our study suggest continuous exposure of population to these two microorganisms. In this research there was a significant relation between coincidence of both infections and age too (P<0.05). These data correlate with earlier studies. The seroprevalences of H.pylori, HAV and the rate of both infections at the same time were higher in females than in males. These findings are different from those reported by other researchers. These results indicate that females are in higher risk of acquisition of these two organisms and could reflect a common mode of transmission of these two pathogens.

In this survey an inverse relation was found between seropositivity of H.pylori and two factors of occupation and the level of education as surrogate for socio-economic status. This findings is in agreement with those reported by others who have indicated that individuals of higher socio-economic status are often less likely to be infected. According to our findings the higher rate of H.pylori seropositivity in lower-socio-economic groups is similar to that of HAV which is transmitted by the feco-oral route. This result reflects the similarity in the route of transmission of these two organisms and supports the notion that one mode of transmission of H.pylori is feco-oral.

Although an association has been reported between type of housing and H.pylori seropositivity, we did not demonstrate such an association between this factor and seropositivity of H.pylori and HAV. This could explain the similar mode of transmission of these two pathogens in people under study.

Epidemiological studies in South America suggested that transmission of H.pylori occurred through water. Researches in Peru identified H.pylori in drinking water. In this study we did not find significant relationship between seropositivity of H.pylori and source of water supply but this relation was statistically significant for HAV seropositivity. This result reveals that drinking water is not a vehicle for H.pylori transmission in people living in the areas under study.

Place of residence has shown a significant relation with anti-H.pylori seropositivity which correlates with poor level of hygiene and sanitation in rural areas than in the city, but statistical evidence of this relationship has not been presented for anti-HAV seropositivity.

According to our findings 22.2% of subjects were seropositive for both anti-H.pylori and anti-HAV antibodies at the same time which confirm that these two infectious agents share common routes of transmission.

This study compared different risk factors in acquisition of H.pylori and HAV infections and showed a strong association between seropositivity of antibodies against H.pylori and HAV which is a
sensitive marker of feco-oral exposure. Our findings are in agreement with earlier reports[9,75,78,10] and support the hypothesis that these two microorganisms share common modes of transmission including feco-oral. Still, common environmental factors could not completely explain the described association between seropositivity of antibodies against H. pylori and HAV. So we are not able to fully explain the routes of transmission of H. pylori whether it is feco-oral or oro-oral due to unavailability of information on all environmental factors.

References

25. Webb PM, Knight T, Greaves S, et al. Relation between infection with Helicobacter pylori and living...