

Original Article**Seroprevalence of helicobacter pylori infection  
among 7-9 year-old children in Zanjan-2004***Manoochehr Mahram\*, Farshid Ahmadi\*\****Abstract**

**BACKGROUND:** H. pylori infection is one of the most common infections worldwide. The prevalence of this infection among children varies due to socioeconomic development and differs among different countries. Regarding the absence of previous studies for the Iranian children, this research was performed to detect the prevalence of H. pylori infection among children of city of Zanjan.

**METHODS:** In this study 278 children of 7-9 years old in Zanjan (summer 2004) were selected by multistage random sampling and then, anti H. pylori antibody (IgG) was assayed on their serum samples. The specimens were examined by ELISA-IgG (DSL Kits made in USA) in the laboratory of Vali-Asr hospital of Zanjan. Titer greater than 15 IU/dL was considered as positive regarding to the false negative or positive states. Finally, the data were analyzed.

**RESULTS:** Out of all obtained samples, 147 were positive and 131 negative, which indicated the prevalence of 52.8% of H. pylori infection in 7-9 year-old children of Zanjan. Also, based on the results there was no significant difference between males and females ( $P = 0.5$ ).

**CONCLUSIONS:** Different studies have shown the prevalence of H. pylori infection in children from 5% to 90%, Moreover, the prevalence in developing countries is higher. The reports varied in different parts of Iran for the adults (e.g. 30.6% in Yazd and 47.5% in Ardebil) but no previous study was done for the children. Our findings in children not only indicate a high prevalence rate but also show the importance of paying more attention to this infection.

**KEY WORDS:** Helicobacter pylori, prevalence, Zanjan.

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**H** pylori infection is one of the most common infections worldwide. First, the bacterium was discovered in 1983 by Barry Marshall and Robin Warren of Perth, in Western Australia<sup>1</sup>. H. pylori is a gram negative, microaerophilic, curved and S-shaped rod which can colonize and grow in human stomach and then, cause damage of mucosa by presenting itself in the forms of gastritis (acute, chronic, chronic active or occasionally atrophic associated with pernicious anemia), ulcer, intestinal metaplasia or neo-

plasms (MALT lymphoma, intestinal and gastric carcinoma<sup>2,3</sup>), and so on. In sequence, GI bleeding, iron deficiency anemia, stricture, perforation and many other complications can occur<sup>1,2,4-6</sup>. Through experimental and clinical studies, there is a significant relationship between H. pylori and gastric cancer<sup>2, 7, 8</sup>. The ability of the bacterium to survive in the acid PH is due to its intense urease activity<sup>6,9</sup>. H. pylori acquisition usually starts in childhood and then gradually develops. The way of transmission is not clear but it seems to be

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fecal-oral; hence, it is highly prevalent in crowded communities<sup>1,2,4,9</sup>.

There are many different ways to detect H. pylori infection prevalence; among them serology is the best screening way<sup>10,11</sup>. By serology, anti-H pylori antibody (IgG) with ELISA is measured with high sensitivity and specificity and with low cost; therefore, this method was used in our study. Although some studies on the prevalence of H. Pylori in adults have been done in Iran, but no previous study on this infection in children was found. So, this study was performed to detect the prevalence rate of H. Pylori contamination in children of Zanjan.

## Methods

In this descriptive and cross-sectional study, during the summer of 2004 the blood samples of 7-9 year-old children living in city of Zanjan were studied to detect the prevalence rate of H. Pylori contamination. The required number of samples for this study was 288, but due to the probability of exclusion of some samples, 300 cases were selected. The samples were obtained by multistage random sampling in which at the first stage six schools were selected from different parts of the city in order to equalize the socio-economic status (cluster sampling). At the second stage, students in grades 2, 3 and 4 were selected in order to obtain the right age groups (stratified sampling), and at the third stage, the final samples were selected randomly (simple random sampling). This type of sampling can be generalized to the whole community to gain validity as high as possible.

After talking to the children's parents and obtaining their consent for taking blood samples, 5 ml of blood of each child was taken with disposable syringes. Samples were transmitted to the laboratory of Vali-Asr Hospital of Zanjan under controlled conditions (cold chain temperature below  $-8^{\circ}\text{C}$ ) and stored in a suitable temperature ( $-20^{\circ}\text{C}$ ). The ELISA kits (DSL made in USA) which had been bought previously were used to test the samples for checking anti- H. pylori IgG. This

method was used in the study since it not only provides reliable assessment of current or prior infection, but also is highly sensitive and specific (approaching 90%)<sup>2,12,13</sup>.

The results were reported in gauge of IU/dL and titer greater than 15 IU/dL was considered as positive and titer less than 10 IU/dL as negative. Although based on the information of the kit brochure, titer between 10-15 IU/dl is considered as borderline or suspicious, in this study these cases were classified as negative. The head of the laboratory did a complete supervision, and then the results were registered in the previously designed tables based on identity data of each child separately. The sensitivity and specificity of the used kits were 95.8% and 98.4%, respectively. SPSS software was utilized for statistical analysis of the results and  $P < 0.05$  was considered significant.

## Results

Out of 300 obtained samples, 22 were excluded because of the severe hemolysis, little amount of the sample and other reasons. So, 278 samples (150 male and 128 female) were examined and 147 cases were found seropositive for H. Pylori; i.e. the prevalence of the infection among 7-9 year-old children in Zanjan was 52.8%. The prevalence in boys and girls was 56% (82 of 150) and 50.7% (65 of 128) respectively, in which the difference was not significant ( $P = 0.5$ ).

## Discussion

Although the result of this study showed a relatively high prevalence of H. Pylori in the children of Zanjan, considering the exclusion of the suspicious samples, the real prevalence seems to be even higher. Only a few studies on the prevalence of H. Pylori were found in Iran, which were mostly related to adults. Therefore, a good comparison inside the country was not possible to be made. In a study by Malekzadeh et al (2002), the prevalence of H. pylori turned out to be higher in adults in West and North of Iran in comparison with the central area of the country. The reported preva-

lence in Ardebil (a city in West-North of Iran) has been 47.5% and in Yazd (a city in the center of Iran) 30.6%<sup>14</sup>.

The prevalence of the infection as a worldwide problem, varies with the socio-economic status of the people; i.e. the rate is lower in developed countries and higher in developing countries<sup>1,2,5</sup>. Some of the reports using similar method to our study are as below: Two studies in Finland (1995 & 1996) revealed the prevalence of the infection in 2 and 12 year-old children, 5% and 6%, respectively<sup>15,16</sup>. The result of a similar research in Belgium in 1996 was 6% prevalence in 6 year-old Belgians and 20% in non-Caucasians of the same age<sup>17</sup>. The research on 12-19 year-old Italians in 1999 showed the rate of 30%<sup>18</sup>. In Spain, a study in 1997 showed the prevalence in age groups of 1-9 and 10-19 years old, 11% and 30% respectively<sup>19</sup>. In a study, in Pediatrics Hospital of Leipzig (Germany), 3315 children were examined by urease breath test in which overall prevalence of H. pylori infection was 13.3% (7.2% male, 6.1% female)<sup>20</sup>. In another study in this country in 1999, the prevalence was 5% in 6 year-old German children, but 44% among Turkish children of the same age living there<sup>21</sup>. In 2001 in Kyushu in Japan, the prevalence of H. pylori infection in 15-19 year-old cases was found 29%<sup>22</sup>. In another study in Japan, a comparison of the prevalence rates of H. pylori between a place near a river and a place far from that, demonstrated the results of 23.8% and 9.8%, respectively<sup>23</sup>. In 1998 in the South of USA, 1024 cases of Indian emigrants were examined and the prevalence of H. pylori among them was reported 92% in all age groups<sup>24</sup>. The results of another study in USA showed the rate of 12% and 18% in European-Americans of 6-9 and 10-14 years old, respectively. These results in African-Americans of the same age groups were 30% and 43%, respectively<sup>25</sup>. Two different reports from UK in 1994 and 1996 revealed the prevalence of H. Pylori 11% in 11 year-old children and 17% in 5-14 year-old children<sup>26,27</sup>.

In Turkey (1998), a study on 1-4 year-old children showed the prevalence of H. Pylori

16%. These rates for the age groups of 5-9, 10-14 and 15-19 were 31%, 47% and 58%, respectively<sup>28</sup>. According to another research in this country in 2003, the prevalence of H. pylori infection in 3-12 year-old children, measured through rapid urease test was reported 49.5%. In this study socioeconomic status had direct correlation with the prevalence<sup>29</sup>. In Srilanka the prevalence of H. pylori, studied through HSPA (H. pylori stool antigen) in 184 children of 4-8 years old, showed the rate of 6.5%. Then, it was studied once again through ELISA-IgG serologic test and result was 27%. Thus, they asserted HPSA is less sensitive than serology for screening or diagnosis of the cases<sup>30</sup>. In Bangladesh, a study in 1995 showed the prevalence of H. Pylori in 82 cases of 2-4 years old 46% and in 238 cases of 5-9 years old 62%<sup>31</sup>. In Korea the prevalence rates of the infection were reported 13% in 1-4 year-old children, 9% in children of 5-9, 25% in age group of 10-14 and 45% in 15-19 year-old cases<sup>32</sup>. In South of China, a study on urban population showed the prevalence in the age groups of <5 and 5-10 years old, 31% and 40% respectively. These rates in the same age groups of rural community were 15% and 21%, respectively<sup>33</sup>. In 1999, in Taipei, a study showed the prevalence in children below 3, 2.8%, with the increasing prevalence rate of 1.25% yearly for the cases between 3-15, reaching 21.5% for the cases of 15-18 years old<sup>34</sup>.

In South Africa, a study on black and colored children in age groups of <2, 2-5 and 5-10 years old revealed the prevalence of H. Pylori 14%, 48% and 67% , respectively<sup>35</sup>. In Nigeria (northern area of the country), the prevalence rates of the infection in the individuals of <10 and 10-19 years old were reported 69% and 91%, respectively<sup>36</sup>. In Nepal a report of 1998 revealed the prevalence rates of approximately 18% and 44% in 4-9 and 10-19 year-old children, respectively<sup>37</sup>. The results of a study in Mexico were 24% in 527 cases of 1-4 years old, 42% in 1809 children of 5-9 years old and 55% in 1854 children of 10-14 years old<sup>38</sup>. In a similar study in Ethiopia (1998), the prevalence in

2-4 year-old children of rural area was reported 48%<sup>39</sup>.

What, all of the above-mentioned results reveal is an evident difference among several reports from different parts of the world which confirms the different worldwide distribution of H. Pylori infection in children. The results of this study indicated that among the developing communities, the H. pylori prevalence in Iranian children is relatively high. Then, the

followings are suggested: First, to decrease the rate of prevalence, the study of suspected sources, such as water, should be considered; second, similar studies should be performed, to find the prevalence of the infection in different parts of the country; third, this kind of infection should be kept in mind by pediatricians in clinic, especially for children with chronic abdominal pain, without any particular reason.

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