INTRODUCTION

*Helicobacter pylori* persistently colonizes gastric mucosa of humans and plays an important role in gastrointestinal diseases, especially peptic and duodenal ulcers as well as gastric cancer.\(^1\) The *H. pylori* infection has emerged as one of the most common chronic bacterial infections worldwide and affects nearly 50% of the world’s population, with most of the infections occurring in the first decade of life.\(^4\) It has been demonstrated that risk of *H. pylori* infection in developing countries with low socioeconomic status is much higher (> 80%) than that in developed countries (< 40%).\(^5,6\)

Although the route(s) of transmission of *H. pylori* infection remain uncertain, potential mechanisms can be ascertained by collecting and analyzing epidemiological data related to *H. pylori* infection. The aim of the present study was to estimate the prevalence and determine the association of *H. pylori* infection with potential risk factors. Study of the prevalence of *H. pylori* infection will help the healthcare authorities to understand the disease burden in our population and take appropriate remedial measures to tackle *H. pylori* associated diseases.
METHODOLOGY

Study was approved by Ethics Committee of Pakistan Institute of Nuclear Science and Technology (PINSTECH) and informed consent was obtained from subjects or parents/guardians of the subjects. Subjects: Asymptomatic healthy individuals residing at Barakaho in the vicinity of Islamabad, were invited to participate in the study. Subjects having any chronic illness or on medication were excluded and a total of 516 urea breath test samples were collected.

Questionnaire: The subjects were interviewed at home by one of the authors using a pre-tested questionnaire, while data about young children was collected from an elder member of the family (one of the parents or an elder brother/sister). Questionnaires contained information on name, age, gender, monthly family income, education level, number of persons in household, number of living rooms, source of drinking water and presence of household animals etc.

13C Urea Breath Test: H. pylori infection was defined by a positive 13C urea breath test (13C UBT) performed on an empty stomach early in the morning. Baseline breath sample was collected in a glass vial by blowing through a straw. Subjects were then given 75 mg 13C urea (Isotec, Miamisburg, Germany) with orange juice and second breath sample was collected 30 minutes later. The two vials were capped securely and transported to the BreathMAT Lab, Nuclear Medicine, Oncology and Radiotherapy Institute (NORI), Islamabad. Sample vials were stored at room temperature until analyzed for 13CO2/12CO2 ratio using BreathMAT plus mass spectrometer (Thermo, Finnigan, Germany) and positive result was defined by a cut-off of more than 5‰.

Statistical Analysis: Statistical analysis was performed using the SPSS 15.0 statistical software program (SPSS Inc, Chicago, USA). Differences in infection prevalence among different groups were analyzed using χ² test. Odds ratio (OR) of H. pylori infection in the presence of a particular factor were used as a measure of association and are presented with a 95% confidence interval (CI). Variables with p value less than 0.05 were considered significantly associated with H. pylori infection.

RESULTS

The population characteristics and prevalence in various age categories has been published before as a brief account however, briefly, the study participants consisted of children and adults (age range 2-70 years, mean 21.36±14.48) with 268 (51.9%) males and 248 (48.1%) females. The prevalence of H. pylori infection in the participants was 74.4% (384/516) with 73.5% males and 75.4% females infected with H. pylori infection (p = 0.622). It was observed that prevalence of infection increased with age in all subjects starting from children (63.5%) to adolescents (78.8%, p = 0.003) and maximum in adults (81%, p < 0.001).

In the study, no significant association was found between H. pylori infection and education levels of asymptomatic adults that were categorized in groups of illiterate (83.3%, 30/36), primary school (84.0%, 42/50), middle school (77.6%, 38/49), high school (76.9%, 40/52) and college and university (88.9%, 16/18) with p value 0.720 as shown in Table-I.

Prevalence of H. pylori infection among city water consumers was found to be (74.0%, 77/104) as compared to user of boring water (73.1%, 106/145) and well water (75.3%, 201/267), though no significant association was seen for source of drinking water (p = 0.885) as shown in Table-II.

This infection was significantly high in those asymptomatic subjects, who had household animals including cat, dog, goat, buffalo, cow, hen or parrot (80.2%, 202/252) than those who had no animals (68.9%, 182/264) in their houses with significant difference (p = 0.004), results are shown in Table-II. The prevalence of H. pylori infection in the group with six or less than six family members (69.8%, 169/242) was lower as compared to the group

<table>
<thead>
<tr>
<th>Education Levels</th>
<th>Subjects</th>
<th>UBT+ (%)</th>
<th>OR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>36</td>
<td>30 (83.3)</td>
<td>1.50 (0.50-4.45)</td>
<td>0.464</td>
</tr>
<tr>
<td>Primary School</td>
<td>50</td>
<td>42 (84.0)</td>
<td>0.63 (0.23-1.71)</td>
<td>0.368</td>
</tr>
<tr>
<td>Middle School</td>
<td>49</td>
<td>38 (77.6)</td>
<td>0.96 (0.38-2.44)</td>
<td>0.940</td>
</tr>
<tr>
<td>High School</td>
<td>52</td>
<td>40 (76.9)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>College and University</td>
<td>18</td>
<td>16 (88.9)</td>
<td>2.40 (0.48-11.9)</td>
<td>0.274</td>
</tr>
</tbody>
</table>

Note: *χ² test among all groups, OR: odds ratio, CI: confidence interval
with seven or more than seven members (78.5%, 215/274), with significant statistical difference ($p = 0.025$, Table-II).

Asymptomatic subjects were categorized into two groups with respect of number of rooms in house as shown in Table-II. The prevalence of *H. pylori* infection in the group with one to three rooms in house (73.3%, 244/333) was comparatively lower than that in the group with four or more than four rooms (76.5%, 140/183), with insignificant association ($p = 0.421$).

As for the association of prevalence and monthly family income, in the three groups (with an average level of Rs 12,892/- per month = approximately USD 151), it was found that individuals with a monthly family income of Rs. ≤3000 had 74.3% (26/35) while those with monthly family income of Rs. 4000 to 9000 and ≥10000 had 73.8% (186/252) and 75.1% (172/229) of *H. pylori* infection, respectively, and the difference was also insignificant ($p = 0.537$, Table-II).

**DISCUSSION**

The variation in the prevalence of *H. pylori* infection between different populations suggests that different parameters such as socioeconomic status and environmental factors play a key role in the acquisition of *H. pylori* infection. Examination of different populations in which some of these factors are relatively constant should provide important information regarding the epidemiology and transmission of *H. pylori* infection.

In last few years, risk factors of *H. pylori* infection have been investigated around the world. *H. pylori* infection was usually considered to be associated with socioeconomic status with contradictory results and for this reason the risk factors of *H. pylori* infection are still not clear.

In the past two years, the Life Science Group, IAD, PINSTECH conducted an epidemiologic survey in order to discern the overall picture of *H. pylori* prevalence and the related risk factors in Barakaho, Islamabad. In the study presented, we have reported high prevalence of *H. pylori* infection (74.4%) in this region, which was similar to the reports of other authors of same region i.e. 76.7%,

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**Table-II: Association of *H. pylori* infection with study variables.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Subjects</th>
<th>UBT+ (%)</th>
<th>OR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of Drinking Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City water</td>
<td>104</td>
<td>77 (74.0)</td>
<td>1.04 (0.59-1.85)</td>
<td>0.869</td>
</tr>
<tr>
<td>Well water</td>
<td>267</td>
<td>201 (75.3)</td>
<td>0.89 (0.56-1.41)</td>
<td>0.628</td>
</tr>
<tr>
<td>Boring water</td>
<td>145</td>
<td>106 (73.1)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>Presence of Household Animals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>252</td>
<td>202 (80.2)</td>
<td>1.82 (1.21-2.72)</td>
<td>0.004</td>
</tr>
<tr>
<td>No</td>
<td>264</td>
<td>182 (68.9)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>Number of Family Members</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤6</td>
<td>242</td>
<td>169 (69.8)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>≥7</td>
<td>274</td>
<td>215 (78.5)</td>
<td>1.57 (1.05-2.34)</td>
<td>0.025</td>
</tr>
<tr>
<td>Number of Rooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>333</td>
<td>244 (73.3)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>≥4</td>
<td>183</td>
<td>140 (76.5)</td>
<td>1.18 (0.78-1.80)</td>
<td>0.421</td>
</tr>
<tr>
<td>Monthly Family Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤3000</td>
<td>35</td>
<td>26 (74.3)</td>
<td>1.18 (0.78-1.80)</td>
<td>0.421</td>
</tr>
<tr>
<td>4000-9000</td>
<td>252</td>
<td>186 (73.8)</td>
<td>1.00 (1.00-1.00)</td>
<td>1.000</td>
</tr>
<tr>
<td>≥10000</td>
<td>229</td>
<td>172 (75.1)</td>
<td>1.07 (0.71-1.61)</td>
<td>0.744</td>
</tr>
</tbody>
</table>

Note: $\chi^2$ test among all groups, OR: odds ratio, CI: confidence interval
It is generally thought that risk factors for cow, goat, birds, etc used for milk, meat and other they got contact with domestic animals like buffalo, this may be due to the reason that current study household animals in houses of studied individuals. This was consistent with the report from India, in which authors found high prevalence of H. pylori infection among consumers of city (74.8%) and well water (92.0%) whereas no association was observed between H. pylori prevalence and tube well water in Bangladesh.

Frequent contact with domestic animals has been identified as a risk factor for the acquisition of H. pylori infection and we found significant association of H. pylori infection with the presence of household animals in houses of studied individuals. This may be due to the reason that current study site was the area of low income residents where, they got contact with domestic animals like buffalo, cow, goat, birds, etc used for milk, meat and other economical benefits.

It is generally thought that risk factors for H. pylori infection include more family members. In the current study, H. pylori infection was relatively more prevalent in those households with seven or more than seven members as compared to six or less than six family members, with significant statistical difference that is in agreement with the other report suggesting congestion in family is a risk factor for acquisition of H. pylori infection.

In addition, no association was observed between prevalence of infection and the number of living rooms in a house. Similarly, the monthly family income had no association with the prevalence of H. pylori infection.

In conclusion, high prevalence of H. pylori infection (74.4%) in the asymptomatic residents of Barakaho, Islamabad, Pakistan was seen. No significant difference was seen between H. pylori infection and gender while statistically significant association was found with increasing age. Presence of household animals and more family members were significantly associated with H. pylori infection while no apparent association with other risk factors such as education, source of drinking water, number of rooms and monthly family income was found in the current study. Given its complications including gastritis and gastric cancer, H. pylori infection endangers public health. These prevalence results may be helpful in defining high risk population of Islamabad, Pakistan and will provide clues to estimate the H. pylori associated disease burden of our future population. Healthcare planning through educational programs on topics like transmission routes of H. pylori infection and relevant preventive measures could be implemented and facilitated.

The current study is the first step to demonstrate the prevalence and identification of risk factors of H. pylori infection while there is need of extensive work to develop a full-blown population based screening and treatment program in Pakistan.

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REFERENCES

Prevalence and Risk Factors of H. pylori Infection


