Seroprevalence and Socio-demographic Factors of *Helicobacter pylori* Infection in Patients with Dyspepsia in Kalibaru Primary Health Care North Jakarta

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**ABSTRACT**

**Aim:** to identify the seroprevalence and its association with socio-demographic factors of *Helicobacter pylori* infection. **Methods:** a cross-sectional study was performed in 111 patients with dyspepsia (according to ROME III) who got treatment at Kalibaru Primary Health Care, North Jakarta from January to February 2015. Patients aged over 18 years and no history of gastrectomy were interviewed and 3 cc venous blood was drawn. Bioramps Laboratories’s Immunochromatography Diagnostic Test (Bio M Pylori®) was used to diagnose patient with *Helicobacter pylori* infection. Chi Square were used to analyzed socio-demographic and T test were used to analyze age. Variables with p<0.25 were analyzed by logistic regression. **Results:** seroprevalence of *Helicobacter pylori* of 111 dyspepsia patients who got treatment in Kalibaru Primary Health Care in this study was 22.5% (95% CI 14.8% - 30.2%). There is no relation between age and Helicobacter pylori infection (p=0.270). Higher socio-economic class was related to lower risk Helicobacter pylori infection (OR 0.2; 95% CI 0.02 – 1.71). Higher crowding index was related to higher risk Helicobacter pylori infection (OR 1.2; 95% CI 0.37 – 4.49).
INTRODUCTION

Helicobacter pylori is a bacteria commonly found and leads to chronic infection in humans. It is estimated that nearly 50% of the world population are infected by the bacteria.¹ The prevalence varies across the world depending on geography, age, race, ethnicity, and socioeconomic status.¹ Several studies have been known to associate Helicobacter pylori infection in the community although there are still some controversy in various studies.² Studies in Kazakhstan³ and India⁴ showed that a good “clean water index” can reduce the prevalence of H. pylori, although it was not established yet in people who use water sources contaminated by H. pylori.³,⁵ Another risk factor of H. pylori is the population density with lack of infrastructure including water resources and public toilet.¹ The number of people living in households is associated with Helicobacter pylori in children,⁵,⁶ but in adults it is still a controversy.³,⁴ An epidemiology study in Guangzhou showed a decline in prevalence of infection due to a decrease in the number of people living in households and socio-economic changes in society, although similar studies in other cities has failed to show it.⁷

Study conducted in private hospitals in Jakarta using histopathology findings also showed a decline in prevalence of H. pylori infection from 12.5% in 1998 to 2.9% in 2005.⁸ Nevertheless, prevalence of H. pylori in Indonesia still vary even though in general is lower than the prevalence abroad. Therefore, it is necessary to know whether the prevalence differences of H. pylori are caused by differences in sanitation, demographic condition and effectiveness of eradication of H. pylori or differences in preparation for diagnostic examinations such as consumption of antibiotics without prescription and also proton pump inhibitors before diagnostic examination.

This study was conducted in Kalibaru village, North Jakarta, a suburb area with low socio-economic level and high population density in which the prevalence of dyspepsia and gastritis is high. The aim of this study is to determine the seroprevalence of Helicobacter pylori infection in patients with dyspepsia in Kalibaru Primary Health Care and its associated factors included age, socio-economic status, crowding index, clean water index and sanitation status of the house to H. pylori infection.

METHODS

This is a cross-sectional study in Kalibaru Primary Health Care in North Jakarta between January 2015 and February 2015. Inclusion criteria were patients with dyspepsia according to ROME III criteria, aged over 18 years and no history of gastrectomy. A single proportion sample size was calculated with α = 0.05 and d = 0.1 and rule of thumbs were used to calculate sample size that resulted in 96 consecutive patients of dyspepsia. Patients who met the inclusion criteria were interviewed and 3 cc of venous blood was drawn. Bioramps Laboratories’s Immunochromatography Diagnostic Test (Bio M Pylori®) was used to diagnose patient with Helicobacter pylori infection. Chi Square were used to analyze socio-demographic variables and T test were used to analyze age. Variables with p<0.25 in bivariate analysis were analyzed by multivariate logistic regression analysis. This study was approved by the Ethics Committee of University of Indonesia (41/UN2.F1/ETHICS/2014).

Socio-economic status was assessed using Hollingshead Four Factors which classified the status into 5 classes.⁹ Clean water index was based on combination of consistency of boiling water before drinking, frequency of restoring and reusing water, and frequency of bathing and

Lower clean water index was related to higher risk Helicobacter pylori infection (OR 1.5; 95% CI 0.57 – 4.04). Lower sanitation status was related to higher risk Helicobacter pylori infection (OR 2.5; 95% CI 1.01 – 6.19). Conclusion: seroprevalence of Helicobacter pylori infection in patient with dyspepsia in Kalibaru village was 22.5%. There is an association between sanitation and Helicobacter pylori infection.

Key words: seroprevalence, Helicobacter pylori, sanitation.
showering. Sanitation status was assessed by a combination of water sources and toilet type. While crowding index is number of people in a house divided by number of room in the house.\textsuperscript{3,4}

**RESULTS**

During the study period, 111 subjects met the inclusion criteria. Of the 111 patients who underwent the test, 25 patients were serologically positive (22.5% (95% CI 14.8% - 30.2%)).

Mean age was 51.4±13.7 years and in the majority were females (71.2% v.s. 28.8%). Based on ethnic distribution, Javanese (45.9%) and Bugis (18%) were the largest. Mean of how long the subjects live in Kalibaru village was 34 years. Higher proportion of subjects did not finished elementary school (43.2%) and very few of the subjects (0.9%) graduated from university/college. As many as 73.9% subjects had monthly incomes below 2,500,000 IDR and only 1.8% subject had more than 5,000,000 IDR per month. Number of people in households in this study reached a median of 5 people per household (min-max, 1-19 people). While the median value of crowding index was 1.75 persons/room (min-max, 0.29-8 person/room). The basic characteristics of subjects based on Helicobacter pylori status can be seen in Table 1.

Among the subjects, proportion of high crowding index was 13.5%, proportion of moderate to low clean water index was 64.9%, poor sanitation status was 45%, and very low socioeconomic status was 62.1%.

Table 2 showed the analysis of socio-demographic factors and their associations to Helicobacter pylori infection. From all these factors, only sanitation status had significant association with Helicobacter pylori.

**DISCUSSION**

The seroprevalence of Helicobacter pylori among 111 dyspepsia patients in Kalibaru village was 22.5% (95% CI 14.8% - 30.2%). This result was lower than studies conducted by Yim et al\textsuperscript{10} in South Korea and Chen et al\textsuperscript{7} in South China. Both studies also showed a decline in prevalence caused by improvement of socio-economic condition and eradication therapy.\textsuperscript{7,10}

Several studies in Kazakhstan\textsuperscript{3}, Vietnam\textsuperscript{11}, Ethiopia\textsuperscript{12}, and India\textsuperscript{4} showed higher seroprevalence of H. pylori which is 86%, 74.6%, 83.3% and 80% consecutively. Demographic and social characteristics of those countries...
according to Human development Index (HDI) of WHO based on their coefficient were 0.679, 0.617, 0.527, 0.429 consecutively.\textsuperscript{13-15} it is relative equivalent with Indonesian HDI coefficient which was 0.629.\textsuperscript{16} There was an inconsistency between socio-economic conditions and \textit{Helicobacter pylori} infection. Indonesia which had relatively similar, even lower Gross National Income and socioeconomic level than those countries has a lower prevalence of \textit{Helicobacter pylori} infection.

Based on socio-demographic condition, Kalibaru Village is slum area and has high density population. From studies and literature, such area has high prevalence of \textit{Helicobacter pylori}. However, our study found the opposite result. Low prevalence of \textit{Helicobacter pylori} in Kalibaru probably was not caused by improvements in sanitation status, socioeconomic, personal hygiene or the environment. From a study in Malaysia, it was found that coffee consumption can increase the risk of infection (OR 4.58 95% CI 2.25 to 9.34), whereas tea consumption may decrease the \textit{Helicobacter pylori} infection (OR 0.03 95% CI 0.01 0.09).\textsuperscript{17} But this still requires further study in Kalibaru Village.

In addition to food habits and patterns, race and ethnicity also play a role. Ethnic majority of this research was Javanese (45.9%), Bugis (18%) and Sundanese (15.3%). Proportion of \textit{Helicobacter pylori} in Javanese ethnicity in this study was 17.9%, while Bugis was 30% and Sundanese was 29.4%. The results are consistent with other studies in Surabaya\textsuperscript{18} and Yogyakarta\textsuperscript{19} which also reported a low prevalence in Javanese ethnics. Studies in five major islands in Indonesia obtained similar trends to this study. The prevalence of \textit{Helicobacter pylori} in Javanese was 2.4% and Bugis 36.7%.\textsuperscript{20} The low prevalence of \textit{Helicobacter pylori}, especially on Java ethnicity, was predicted due to close relationship between ancestors of ethnic Javanese and Malay. Further study is needed to determine habits, diet and genetic polymorphisms to confirm this.

Other cause of lower seroprevalence of \textit{Helicobacter pylori} in this study is consumption of antibiotics. Based on the “Book Report Health Center activities” in 2013, antibiotic amoxicillin is the sixth most prescribed drug.\textsuperscript{21} This research also found 29.7% of subjects usually used antibiotics. Antibiotics amoxicillin and tetracycline become the most commonly

### Table 2. Analysis of \textit{Helicobacter pylori} socio-demographic factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>H pylori (+)</th>
<th>H pylori (-)</th>
<th>P value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (SD)</td>
<td>48.7 (13.0)</td>
<td>52.2 (13.8)</td>
<td>0.270</td>
<td></td>
</tr>
<tr>
<td>Socio-economic status, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Very Low</td>
<td>17 (23.3)</td>
<td>52 (75.4)</td>
<td>0.183</td>
<td>0.2 (0.02 – 1.71)</td>
</tr>
<tr>
<td>- Low</td>
<td>7 (25.9)</td>
<td>20 (74.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Moderate</td>
<td>0</td>
<td>10 (100.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- High</td>
<td>1 (20.0)</td>
<td>4 (80.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Very high</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sanitation status*, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Good</td>
<td>11 (16.2)</td>
<td>57 (83.8)</td>
<td>0.048*</td>
<td>2.5 (1.01 – 6.19)*</td>
</tr>
<tr>
<td>- Bad</td>
<td>14 (326)</td>
<td>36 (67.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean water index, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- High</td>
<td>7 (17.9)</td>
<td>32 (82.1)</td>
<td>0.396</td>
<td>1.5 (0.57 – 4.04)</td>
</tr>
<tr>
<td>- Mod-low</td>
<td>18 (25.0)</td>
<td>54 (75.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crowding index, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Low (≤2)</td>
<td>17 (23.6)</td>
<td>55 (76.4)</td>
<td>0.741</td>
<td>1.2 (0.37 – 4.49)</td>
</tr>
<tr>
<td>- mod (2-3)</td>
<td>4 (16.7)</td>
<td>20 (83.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- High (&gt;3)</td>
<td>4 (26.7)</td>
<td>11 (73.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* significant (p<0.05, logistic regression analysis)
consumed by 15.3% and 4.5% subjects consecutively. Amoxicillin and tetracycline are antibiotics for *Helicobacter pylori* eradication. So it is possible that a spontaneous seroconversion happened in patients taking these antibiotics. However, this was disputed by WK Leung et al who conducted research using Urea Breath Test (UBT) in patients consumed antibiotics for non-gastric infection. Leung revealed that use of penicillin or cephalosporin was very rarely to cause eradication of *Helicobacter pylori* infection.22

In this study, mean age of patients with positive *Helicobacter pylori* infection were younger than patients with negative results. By age group, the proportion of *Helicobacter pylori* infection was increased according to age group and decreased when reaching age of >60 years. There was no significant relationship between age and *Helicobacter pylori* infection statistically. Results of this study were consistent with similar studies in Indonesia. Research conducted by Syam in Jakarta also found no relation between age and *Helicobacter pylori* infection statistically. Another study in five major islands in Indonesia also obtained similar results with Kalibaru which was higher proportion of *Helicobacter pylori* were in two age groups, under 29 years old and 50-59 years old group.23 Study abroad showed different results. In South Korea, the older the age, the higher the seroprevalence of *Helicobacter pylori* until it reach the age of 60 years and then there was a decline.19 This difference may be caused by low socioeconomic level, education levels as well as low hygiene level.

In this study, 62.2% of subjects belongs to a very low socioeconomic class. The higher the socioeconomic level, the lower the risk of *Helicobacter pylori* infection (OR 0.2; 95% CI 0.02 to 1.716; p = 0.18). Socioeconomic status was assessed based on level of employment, education and marital status. Low socioeconomic status caused poor knowledge about disease. It resulted in lower eradication rate that made the prevalence remains high.

Proportion of *Helicobacter pylori* in subjects with poor sanitation was higher compared to subjects who had good sanitation status. The lower the sanitation status, the higher the risk of *Helicobacter pylori* infection (OR 2.5; 95% CI 1.01 to 6.19; p = 0.044). A similar trend was found in studies in Kazakhstan and India where the proportion of *Helicobacter pylori* was found higher in subjects who use well water (p<0.05) and also river (p<0.05).3,8 The use of public toilets can increase spread of infection due to lack of hygiene behavior among individuals, while use of well water sources, especially shallow wells, increases the risk of transmission of *Helicobacter pylori*.

In this study, as many as 35.1% subjects had good clean water index. Proportion of *Helicobacter pylori* in the low clean water index was higher than the proportion of *Helicobacter pylori* in the high clean water index. The lower the index, the higher the risk of *Helicobacter pylori* infection (OR 1.524; 95% CI 0.57 to 4.04; p = 0.396). In studies in Kazakhstan3 and India4, the association between clean water index with *Helicobacter pylori* are statistically significant. The lower the index, the higher the proportion of *Helicobacter pylori* (OR 14; 95% CI 4.8 to 40) and (OR 13.9; 95% CI 6.9 to 27.7).3,4

In this research, additional analysis had been done to know the relationship of “clean water index” with poor environmental sanitation status (OR 2.58; 95% CI 1.01 to 6.19; p = 0.044). In this result whether the index was good or not, the seroprevalence was still high in subjects with poor environmental sanitation.

From this study, subjects with high crowding index was 13.5 percent. The higher the crowding index, the greater the risk of *Helicobacter pylori* infection although this is not statistically significant (OR 1.2; 95% CI 0.37 – 4.49). Density plays an important role in transmission of *Helicobacter pylori*, especially among the children. The higher the crowding index, the higher the oral-oral and fecal-oral transmission. Porras et al24 on research in six Latin American countries also strengthened it. Higher proportion of *Helicobacter pylori* was found in individuals who as a child shared bedroom with siblings and also in individuals with high household density. However, this is still a matter of controversy in adult population. A similar proportion found in studies in Kazakhstan and India.3,4 Controversy between density in households and *Helicobacter*
pylori infection in adults population was answered by Nurgalieva et al in Kazakhstan³ and Ahmed in India.⁴ They said that transmission of Helicobacter pylori is not influenced by density alone but it depends on hygiene habits of people in the households.³ ⁴

The limitation of this study was that this study used cross-sectional design. Although it can be used to determine risk factors of Helicobacter pylori infection, it was difficult to determine causality because there was no temporal relationship. Research only focused on factors related to personal and environmental hygiene. Additional research is needed to look for other factors such as diet, ethnicity, history of childhood habits to get the whole picture.

CONCLUSION

Seroprevalence of Helicobacter pylori infection in Kalibaru village was 22.5% (95% CI 14.8% - 30.2%). There is an association between environmental sanitation status and Helicobacter pylori infection.

REFERENCES