Demographical Distribution on the Incidence of *Helicobacter pylori* Infection in Jakarta: Obtaining Samples from 5 Municipalities

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ABSTRACT

Background: *Currently, the hospital-based studies on Helicobacter pylori (H. pylori) have demonstrated that the incidence of H. pylori infection tends to decline in Indonesia. On the other hand, no population-based study has ever been conducted. Therefore, our study was performed to evaluate the true incidence of H. pylori found among the population.*

Method: *This study was a surveillance using cross-sectional design. The samples used in our study were randomly selected from 1,645 samples including those from five municipalities of Special Capital Region of Jakarta in 2006. Immunochromatographic test (ICT) was utilized to establish the diagnosis of H. pylori infection. The test has demonstrated high sensitivity and specificity for Indonesian population.*

Results: *The seroprevalence of H. pylori infection among 310 patients was 52.3% (162 out of 310 patients) with mean age of 43.48 $\pm$ 10.45 years. There was no difference regarding seroprevalence in both groups of < 40 year and > 40 years of age (52.3% and 52.2%). The highest prevalence of H. pylori infection was found in West Jakarta (66.1%); while the lowest prevalence was found in South Jakarta (41.0%). The incidence of H. pylori infection between those who were alcoholic was equal to those who were not alcoholic (46.2% vs. 52.5%). Similar result was also found between smokers and non-smokers (53.8% vs. 51.8%).*

Conclusion: *In this study, we found that H. pylori seroprevalence remains high in the population. Various seroprevalences of H. pylori infection were found among five municipalities in Jakarta.*

Keywords: *Helicobacter pylori, Jakarta, seroprevalence*

ABSTRAK

Latar belakang: *Saat ini penelitian berdasarkan data rumah sakit tentang Helicobacter pylori (H. pylori) menunjukkan insiden infeksi H. pylori cenderung menurun di Indonesia. Di sisi lain, penelitian populasi terkini belum pernah dilakukan. Oleh karena itu, penelitian ini dilakukan untuk mengevalusi insiden infeksi H. pylori di populasi.*

Metode: *Penelitian ini merupakan surveilans menggunakan metode potong lintang. Sampel yang digunakan pada studi ini dipilih secara acak dari 1.645 sampel yang mengikutsertakan lima kota di Provinsi Daerah Khusus Ibukota (DKI) Jakarta pada tahun 2006. Untuk diagnosis infeksi H. pylori digunakan tes imunokromatografi. Metode ini memiliki sensitivitas dan spesifisitas yang baik pada populasi di Indonesia.*

Hasil: *Seroprevalensi infeksi H. pylori di 310 pasien adalah 52,3% (162 dari 310 pasien) dengan rata-rata usia 43,48 $\pm$ 10,45 tahun. Tidak terdapat perbedaan seroprevalensi di dua kelompok usia < 40 tahun dan > 40 tahun (52,3% dan 52,2%). Prevalensi tertinggi infeksi H. pylori ditemukan di Jakarta Barat (66,1%), sedangkan prevalensi terendah ditemukan di Jakarta Selatan (41,0%). Infeksi H. pylori diantara peminum alkohol hampir*

sama dengan bukan peminum alkohol (46,2% dan 52,5%). Hasil serupa ditemui pada perokok dan bukan perokok (53,8% dan 51,8%).

Simpulan: *Dalam penelitian ini ditemukan bahwa seroprevalensi H. pylori masih tinggi di populasi. Seroprevalensi infeksi H. pylori berbeda-beda diantara lima kota di Jakarta.*

Kata kunci: *Helicobacter pylori, Jakarta, seroprevalensi*

INTRODUCTION

Helicobacter pylori (*H. pylori*) infection is one of the most common infection found in human.[1] It is estimated that *H. pylori* has infected 50% of world population.[2] The infection will bring serious impacts starting from symptoms of dyspepsia, gastritis, peptic ulcer to gastric cancer.[3,4,5] Thus, *H. pylori* eradication should be performed for patients with *H. pylori* infection.[4]

There is different pattern of *H. pylori* infection between Western and developing countries. The prevalence in Western countries has been decreasing in the last few years; while it is still increasing in developing countries. The increasing prevalence is correlated with some risk factors such as low economic background, densely populated location, a great number of children in a family, lack of access to available clean water.[2] Furthermore, there is a hypothesis about the pattern of prevalence for *H. pylori* infection, which estimates that the rate overall infection will be reduced in 20th century due to advanced socio-economic background and the use of antibiotics.[6]

Until now, there is limited data about the prevalence of *H. pylori* in Indonesia. Between 1998 and 2005, a study has been conducted to identify the prevalence of *H. pylori* infection based on hospital data and it showed a dramatic reduction in the incidence from 12.8% in 1998 to 2.9% in 2005.[7] However, no study has been conducted to obtain data from population about *H. pylori* infection. Our study was a population-based study aimed for identifying the incidence of *H. pylori* in the population using serological method. The study also compared the prevalence of *H. pylori* based on age group, alcoholic drinking and smoking habit.

METHOD

Our study was a surveillance using cross-sectional design. Samples were randomly obtained from 1,645 participants in five municipalities of Special Capital Region of Jakarta in 2006. Diagnosis of *H. pylori* infection was defined using serological test, i.e. the Bio M *pylori* immunochromatographic test (ICT). The serological test was performed using Biomedic kit of Mataram® by utilizing local antigen to evaluate the presence of antibody in blood specimen of study subjects. The method has high sensitivity and specificity.

RESULTS

Seroprevalence of *H. pylori* infection was 52.3% (162 out of 310 patients) with mean age of 43.48 $\pm$ 10.45 years.

The subjects were categorized into two age groups and we found that there was no difference of seroprevalence in both groups, i.e. between those with < 40 years and those who were > 40 years (52.3% and 52.2%). Moreover, when the seroprevalence was evaluated based on sex, we found higher seroprevalence in female than male subjects, however, it was not significantly different (p = 0.744).

In our study, the social economic background was evaluated based on education level and economic status. The education level was categorized into 7 groups and seroprevalence more than 60% was found in illiterate subjects (61.5%), in those who had completed their senior high (61.6%). The economic status was classified into three groups based on their income per month considering the minimal standard income in Indonesia was at IDR 600,000 in 2006. Surprisingly, the highest seroprevalence was indeed found in those with high economic status with monthly income of more than IDR 1,200,000, i.e. as many as 59.3%; however, it was not statistically significant.

Based on their location, the highest seroprevalence of *H. pylori* infection was found in Wes Jakarta (66.1%); while the lowest prevalence was found in South Jakarta (41.0%).

The correlation between behavior and *H. pylori* infection can be seen in Table 2. *H. pylori* infection was similar between alcoholic and non-alcoholic subjects (46.2% and 52.5%). Similar result was also found between smoker and non-smoker subjects (53.8% and 51.8%).

Table 1. The prevalence of *Helicobacter pylori* infection based on demographical condition

Variables	*Helicobacter pylori* category		Total	
	Positive n (%)	Negative n (%)	n	p
Frequency	162 (52.3)	148 (47.7)	310	
Age (mean ± SD, years)	43.48 ± 10.45	44,1 ± 10.96		
Age group (years)				
< 40	68 (52.3)	62 (47.7)	130	0.965
≥ 40	94 (52.2)	86 (47.8)	180	
Sex				
Male	66 (51.2)	63 (48.8)	129	0.744
Female	96 (53)	85 (47)	181	
Education level				
Illiterate	8 (61.5)	5 (38.5)	13	0.102
Incomplete elementary level	21 (52.5)	19 (47.5)	40	
Complete elementary level	17 (38.6)	27 (61.4)	44	
Junior high	29 (46.8)	33 (53.2)	62	
Senior high	69 (61.6)	43 (38.4)	112	
Academy/diploma level	5 (33.3)	10 (66.7)	15	
Undergraduate/Master/Doctor	13 (54.2)	11 (45.8)	24	
Economic status				
Low	105 (50.7)	102 (49.3)	207	0.698
Moderate	28 (52.8)	25 (47.2)	53	
High	16 (59.3)	11 (40.7)	27	
Municipalities				
North Jakarta	24 (39,3)	37 (60.7)	61	0.002
South Jakarta	25 (41)	36 (59)	61	
West Jakarta	37 (66.1)	19 (33.9)	56	
East Jakarta	51 (64.6)	28 (35.4)	79	
Central Jakarta	25 (47.2)	28 (52.8)	53	

Table 2. Prevalence of *Helicobacter pylori* infection based on behavior

Behavior	*Helicobacter pylori* category		Total	
	Positive n (%)	Negative n (%)	n	p
Smoking				
Yes	35 (53)	30 (46.2)	65	0.7
No	127 (51.8)	118 (48.2)	245	73
Alcohol consumption				
Yes	6 (46.2)	7 (53.9)	13	0,6
No	156 (52.5)	141 (47.5)	297	53

DISCUSSION

Seroprevalence of *H. pylori* infection remains high, i.e. it was 52.3% with the highest prevalence was found in West Jakarta (66.1%) and the lowest was found in South Jakarta (41.0%). A study conducted by Saragih et al in 2007 using hospital-based data and histopathology demonstrated that lower incidence of *H. pylori* infection as many as 2.9%.[7]

A study conducted in South Korea by Yim et al using serological test showed a pattern of lower incidence from 66.9% in 1998 to 59.6%.[8] A study performed by Chen et al in Guangzhou, China also showed lower seroprevalence, i.e. 62.5% in 1993 to 47% in 2003.[9]

A study conducted in Shanghai, China demonstrated an increase of seroprevalence from 40.5% in 1990 to 58.3% in 2001. It showed different results compared to the study conducted in Guangzhou and we assume that because there was increased number of immigrant from rural to urban area at that time.[10]

The pattern of *H. pylori* infection is different between Western and developing countries. The incidence tends to be higher in developing countries and it is associated with its socio-economic background, population density and the availability of clean water.[2] On the other hand, Asia Pacific regions including Indonesia have a relatively various different prevalence among the countries or even among the cities.[1] The seroprevalence in our study was evaluated in one step measurement and therefore, we cannot assess the trend. However, if we compare the result with the prevalence of seroprevalence in other Asian countries and previous studies, we can say that the prevalence of *H. pylori* was quite high.

In this study, the subjects were categorized into two groups, i.e. those less than 40 years of age and those who were 40 or over 40 years of age. We found similar percentage for both age groups (52.3% vs. 53.2%). Statistically, there was no significant difference

between the factor of age and *H. pylori* infection. A study conducted by Staat et al in the United States compared the *H. pylori* infection in adults and children and it demonstrated that *H. pylori* infection was correlated significantly with increasing age (OR= 1.07/ years).[11] A study conducted by Marie in 2007 in Saudi Arabia using enzyme-linked immunosorbent assay (ELISA) method to detect *H. pylori* infection showed that there was an increasing prevalence in older age.[12]

A Korean multicenter study which was conducted for 13 years with 19,272 showed different analysis. The cross-sectional study demonstrated that *H. pylori* infection was increasing with age until reaching the age of 40-49 years and the rate of infection was subsequently constant.[13] However, the results of the study are doubtful since another study in Canada demonstrated that there is a possibility that increased infection is caused by other risk factors and not only increasing with age. Moreover, when the results of our study were compared by developing a cohort synthesis based on data from 1998, 2005 and 2011 (the birth cohort), we actually found that the seroprevalence is decreasing with age. It indicates that the age alone does not increase the risk of *H. pylori* infection and lower prevalence may occur due to antibiotic or proton pump inhibitor (PPI) treatment although it is not intended for formal eradication treatment.[13] Another study categorized their subjects into 2 groups, i.e. those with and without eradication treatment. The number of samples was 580 subjects and the study showed that there was no correlation between age and *H. pylori* infection.[14]

A study conducted in Irlandia with 4,742 participants was the first study that demonstrated the correlation between smoking habit and *H. pylori* infection although the previous studies showed contrary results. In this study, they compared smokers, ex-smokers and non-smokers with 462, 300, and 693, respectively. The results of this study showed that both smokers and ex-smokers had similar prevalence for *H. pylori* infection. The similar results can be obtained since nicotine exerts effects on vascular beds of gastric mucosa, mucous secretion and secretion of epidermal growth factors that may increase colonization when it is exposed to microorganism. The study also evaluated the correlation with alcohol consumption; however there was no significant correlation found.[15]

In our study, we found similar results of prevalence between subjects with and without *H. pylori* infection based on their smoking habit and alcohol consumption. The limitation of our study is that there was smaller number of smokers than non-smokers, i.e. 65 vs. 245 subjects. There was also less subjects who had alcohol consumption (13 subjects) compared to those who did not have alcohol consumption (297 subjects).

CONCLUSION

Based on our study, it can be concluded that the seroprevalence of *H. pylori* remains high in our population and different seroprevalence of *H. pylori* infection was found among five municipalities in Jakarta.

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