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# Research Article
# Prevalence and Risk Factors of *H. pylori* Induced Gastritis among Selangor Urban Population

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## Abstract

**Background and Objective:** *Helicobacter pylori* is relatively new and at the preliminary stage in Malaysia. However, it is limited to find how Malaysians are aware about these microorganisms. The aim of current study was to identify the prevalence and risk factors associated with *H. pylori* infection in gastric ulcer patients. **Materials and Methods:** This is a cross-sectional quantitative study which was conducted in the selected private clinics in Kelana Jaya, Selangor state by using a systematic random sampling method. It was carried out among 240 respondents above 18 years old by using a validated structured questionnaire. **Results:** The prevalence of having gastritis was 0.56% with mean age±SD 30.2±9.6. Age, weight, marital status, smoking, drinking coffee, type of food, spicy food, have dental problem and family history were significantly associated with gastritis by using chi square test and independent t-test. However, only family history (Adj OR = 1.10, p>0.001), marital status (p = 0.001), weight (Adj OR = 1.065, p = 0.004) and age (Adj OR = 1.097, p = 0.003) were the most important predictable factors that related with gastritis in the multiple logistic regression. **Conclusion:** The high prevalence of gastritis in Malaysia is attributable to some risk factors such as: Age, weight, smoking, type of food, spicy food and family history. Further validation of our findings warrants study of larger number of cases.

Key words: *H. pylori*, gastritis, risk factor for gastritis, gastritis in Malaysia, Selangor population

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Gastric inflammation or also known as gastritis is a constant outcome in patients infected with *H. pylori*[1,2]. It was reported that the *H. pylori* pathogenicity was confirmed by biopsy of specimens from patients with gastritis. *Helicobacter pylori* were also reported to cause peptic ulcer and certain types of gastric cancer[3]. As per WHO suggestion, *H. pylori* toxin has carcinogenic impact on gastrointestinal tract similar to the effect of cigarette smoking[4]. Globally, *H. pylori* infection is one of the major health problems with great variations in its prevalence among different cultural and ethnic groups[5]. It affects more than half of the world's population: Its prevalence was 25% in developed countries relative to 90% in developing countries[6].

South-East Asia is culturally diverse with multiple ethnics groups and indigenous communities[5]. One of the predominant ethnic groups is the Malays (Melayu) who are of Austronesia lineage[7]. Likewise, Malaysia, a multiracial country, comprises three main ethnic groups, viz Malays, Indians and Chinese[8]. The basis of racial variations in *H. pylori* infection rates is obscure. Although *H. pylori* transmission is still dubious oral-oral and oral-fecal routes are supposed to be the chief modes of spread. Most infections are acquired in childhood[9]. The overall prevalence of gastritis was reported to be 62%: 22% of patients with gastritis were positive for *H. pylori*[9].

The immense burden of *H. pylori* infection compels infected individuals to live the rest of their lives depending on drugs, avoiding certain foods and drinks[10]. Hence, this has prompted this study to estimate the prevalence and determine the association of *H. pylori* infection with potential risk factors in Selangor, Malaysia. Study of the prevalence of *H. pylori* infection will help the healthcare authorities to understand the disease burden in Malaysian population and take appropriate remedial measures to tackle *H. pylori* associated diseases.

## MATERIALS AND METHODS

This is a cross-sectional quantitative study was conducted in Selangor, Malaysia from August to December, 2017. The study population was all Malaysian aged above 18 years old who attended the selected private clinics in Selangor state. The sample size required was 240 which were calculated by using Kish formula Out of all private clinics in Petaling Jaya, Selangor state, 6 private clinics were selected by using Quota sampling proportionately to collect our data in the 1st stage. Forty participants were selected from each clinic concurrently by using convenience sampling in the second stage. The inclusion criteria for our participants are those who have diagnosed with gastritis, positive *H. pylori* test or at least two of the following symptoms:

- Upper abdominal pain or discomfort, bloating, nausea, vomiting, or early satiety
- Persistent or recurrent symptoms occurring at least 3 times/week during>3 months in the year or years preceding the study
- Absence of nocturnal or postprandial symptoms of gastroesophageal reflux
- No previous abdominal surgery except for uncomplicated appendectomy, cholecystectomy or hernia repair

On the other hand, we excluded those who are unable to communicate due to different illness, below than 18 years old and have no symptoms of gastritis or negative *H. pylori* test.

A face to face interview was used to collect data from eligible patients by using a structured questionnaire specifically developed for this study. A questionnaire validation was carried out using face validity, content and expert validity and back-to-back translation by 5 experts including (2 internal medicine specialists, 2 public health specialists and 1 statistician). After that a pretest was done by distributing the questionnaires to 20 participants to ensure that the questions are easily understandable and validated. The questionnaire consists of 3 parts; socio-demographic, food and habits and health problem. The dependent variable was having gastritis. The participants were considered "having gastritis" If the diagnosed result for *H. pylori* was positive during the past 6 months. Those who never have gastritis and their lab result for *H. pylori* were considered as "Not having gastritis".

Data was collected by distributing the questionnaire to the participants and inserted in SPSS version 21 for analysis. The categorical variables were tabulated and reported as frequencies with their respective percentages. Continuous variables were summarized as means with their standard deviation. Associations between the categorical variables were determined using the chi square test with p-values $<0.05$ considered statistically significant while the relationships between continuous variables were assessed by using the Independent t-test. Then multiple logistic regressions were used when we performed the multivariate analysis. This study was approved by the Research and Ethics Committee of Lincoln University College. Patients were informed about the purpose of this research. Verbal agreement and consent form were given by the patients before any sample collection or interview.

## RESULTS

**Descriptive analysis:** Table 1 shows that out of total 240 participants in this study, the prevalence of gastritis or *H. pylori* was 56.6%. The mean age±SD of the participants was 30.2±9.6 while the mean weight±SD was 66.7±12.0 and the mean income±SD was 5869.2±3392.7. Most of respondents were males 132 (55.0%), being Malay 122 (50.8%), married 200 (83.0%), have secondary education 188 (78.3%), smoking 134 (55.8%), drinking tea 94 (39.2%), drinking coffee 122 (50.8%), consuming hot food 208 (86.7%), consuming spicy food 144 (60.0%), eating at home 172 (71.7%). It was found that bread was the most food was being eaten regularly in early morning 82 (34.2%) followed by cereals 38 (15.8%), coffee 32 (13.3%), oats 16 (6.7%), tea 8 (3.3%) while others were 64 (26.7%).

**Bivariate and multivariate analysis:** Independent t-test and Chi squared test were used to perform the analysis between having gastritis due to *H. pylori* and all included socio-demographic factors as reported in Table 2. By using Independent t-test, it was found that age and weight were statistically associated with having gastritis ($p = 0.001$, $p = 0.001$), respectively. On the other hand, income was reported as not statistically significant with having gastritis ($p = 0.259$). Chi square was performed and found that gender and marital status were statistically associated with having gastritis ($p = 0.016$, $p = 0.001$) while race and educational status were found not statistically associated with having gastritis ($p = 0.117$, $p = 0.126$), respectively.

For food and habit factors, chi square was used and showed that smoking, drinking coffee, having regular food in early morning and having spicy food were statistically associated with having gastritis ($p = 0.001$, $p = 0.001$, $p = 0.001$, $p = 0.001$), respectively. On the other hand, drinking tea and where you eat were reported to be not statistically associated with having gastritis ($p = 0.207$, $p = 0.190$), respectively by performing Chi square test.

With regard to health problems factors, it was found that having dental complain and history of having ulcer and acid reflux were statistically associated with having gastritis due to *H. pylori* ($p = 0.001$, $p = 0.001$) respectively. However, previous stomach or intestine ulcer and have chronic alcoholism were not statistically associated with having gastritis ($p = 0.489$, $p = 0.214$), respectively.

As shown in Table 3, multiple logistic regression analysis revealed the most important factors that can be predicted to have association with having gastritis due to *H. pylori* after

Table 1: Descriptive analysis for socio-demographic, food and habits and health problem factors

| Variables | Frequency | Percentage | Mean±SD |
|---|---|---|---|
| Age* | | | 30.2±9.6 |
| Weight* | | | 66.7±12.0 |
| **Gender** | | | |
| Male | 132 | 55.0 | |
| Female | 108 | 45.0 | |
| **Race** | | | |
| Malay | 122 | 50.8 | |
| Chinese | 54 | 22.5 | |
| Indian | 42 | 17.5 | |
| Others | 22 | 9.2 | |
| **Marital status** | | | |
| Single | 36 | 15.0 | |
| Married | 200 | 83.0 | |
| Divorce/widow | 4 | 1.7 | |
| **Educational status** | | | |
| Primary | 6 | 2.5 | |
| Secondary | 188 | 78.3 | |
| Degree | 46 | 19.2 | |
| Income* | | | 5869.2±3358.6 |
| **Smoking** | | | |
| Yes | 106 | 44.2 | |
| No | 134 | 55.8 | |
| **Drink tea** | | | |
| Yes | 94 | 39.2 | |
| No | 146 | 60.8 | |
| **Drink coffee** | | | |
| Yes | 122 | 50.8 | |
| No | 118 | 49.2 | |
| **Regular food** | | | |
| Hot | 208 | 86.7 | |
| Cold | 32 | 13.3 | |
| **Spicy food** | | | |
| Yes | 144 | 60.0 | |
| No | 96 | 40.0 | |
| **Food in early morning** | | | |
| Bread | 82 | 34.2 | |
| Cereals | 38 | 15.8 | |
| Oats | 16 | 6.7 | |
| Tea | 8 | 3.3 | |
| Coffee | 32 | 13.3 | |
| Others | 64 | 26.7 | |
| **Eat in/out home** | | | |
| In | 172 | 71.7 | |
| Out | 68 | 28.3 | |
| **Have dental complain** | | | |
| Yes | 116 | 48.3 | |
| No | 124 | 51.7 | |
| Have gastritis | | | |
| Yes | 136 | 56.7 | |
| No | 104 | 43.3 | |
| **Diagnosed with stomach/intestine ulcer** | | | |
| Yes | 22 | 9.2 | |
| No | 218 | 90.8 | |
| **Family history** | | | |
| Yes | 142 | 59.2 | |
| No | 98 | 40.8 | |
| **Chronic alcoholism** | | | |
| Yes | 2 | 0.8 | |
| No | 238 | 99.2 | |
| Total | 240 | 100.0 | |

*Numerical variable

Table 2: Bivariate analysis between having gastritis due to *H. pylori* and socio-demographic, food and habits and health problem factors

| | Having gastritis | | Not having gastritis | | | |
|---|---|---|---|---|---|---|
| Variables | Number | Percentage | Number | Percentage | $\chi^2$ | p-value |
| Age* | 32.0±10.5* | | 27.0±7.3* | | 4.652** | 0.001 |
| Weight* | 70.6±11.6* | | 61.6±10.6* | | 6.269** | 0.001 |
| Gender | | | 5.803 | 0.016 | | |
| Male | 84 | 63.6 | 48 | 36.4 | | |
| Female | 52 | 48.1 | 56 | 51.9 | | |
| Race | | | | | 5.898 | 0.117 |
| Malay | 66 | 54.1 | 56 | 45.9 | | |
| Chinese | 38 | 70.4 | 16 | 29.6 | | |
| Indian | 20 | 47.6 | 22 | 52.4 | | |
| Others | 12 | 54.5 | 10 | 45.5 | | |
| Marital status | | | | | 15.529 | 0.001 |
| Single | 12 | 33.3 | 24 | 66.7 | | |
| Married | 124 | 62.0 | 76 | 38.0 | | |
| Divorce/widow | 0 | 0.0 | 4 | 100.0 | | |
| Educational status | | | 4.150 | 0.126 | | |
| Primary | 4 | 66.7 | 2 | 33.3 | | |
| Secondary | 112 | 59.6 | 76 | 40.4 | | |
| Degree | 20 | 43.5 | 26 | 56.5 | | |
| Family income* | 6085.3±3539.9* | | 5586.5±3201.8* | | 1.132** | 0.259 |
| Smoking | | | | | 13.359 | 0.001 |
| Yes | 74 | 69.8 | 32 | 30.2 | | |
| No | 62 | 46.3 | 72 | 53.7 | | |
| Drink tea | | | | | 1.596 | 0.207 |
| Yes | 58 | 61.7 | 36 | 38.3 | | |
| No | 78 | 53.4 | 68 | 46.6 | | |
| Drink coffee | | | | | 11.240 | 0.001 |
| Yes | 82 | 67.2 | 40 | 32.8 | | |
| No | 54 | 45.8 | 64 | 54.2 | | |
| Regular food | | | | | 15.078 | 0.001 |
| Hot | 128 | 61.5 | 80 | 38.5 | | |
| Cold | 8 | 25.0 | 24 | 75.0 | | |
| Spicy food | | | | | 19.016 | 0.001 |
| Yes | 98 | 68.1 | 46 | 31.9 | | |
| No | 38 | 39.6 | 58 | 60.4 | | |
| Eat in/out home | | | | | 1.717 | 0.190 |
| In | 102 | 59.3 | 70 | 40.7 | | |
| Out | 34 | 50.0 | 34 | 50.0 | | |
| Have dental complain | | | | | 12.815 | 0.001 |
| Yes | 84 | 67.7 | 40 | 32.3 | | |
| No | 52 | 44.8 | 64 | 55.2 | | |
| Diagnosed with stomach/intestine ulcer | | | | | 0.479 | 0.489 |
| Yes | 14 | 63.6 | 8 | 36.4 | | |
| No | 122 | 56.0 | 96 | 44.0 | | |
| Family history | | | | | 38.897 | 0.001 |
| Yes | 104 | 73.2 | 38 | 26.8 | | |
| No | 32 | 32.7 | 66 | 67.3 | | |
| Chronic alcoholism | | | | | 1.542 | 0.214 |
| Yes | 2 | 100.0 | 0 | 0.0 | | |
| No | 134 | 56.3 | 104 | 43.7 | | |
| Total | 240 | | 100.0 | | | |

*Numerical variable and **Independent t-test

controlling the confounders (p>0.05) by using stepwise backward logistic regression method. It was demonstrated that family history (p>0.001), marital status (p = 0.001), weight (p = 0.004), spicy food (p = 0.041) and age (p = 0.003) made a significant contribution to prediction, whereas, other variables were not. The most important factors responsible for having gastritis were identified by using Wald criterion, which gave the 'importance' of the contribution of each variable in the model. The Wald test estimated that family history and marital status were the most important predictors of having gastritis.

Table 3: Multiple logistic regression analysis for the most important factors related to gastritis due to *H. pylori*

| Variables | B | SE | Wald | df | Significant level (p-value) | Adj (OR) | 95% CI for EXP (B) Lower | Upper |
|---|---|---|---|---|---|---|---|---|
| Family history | 2.307 | 0.391 | 34.856 | 1 | >0.001 | 1.100 | 0.046 | 0.214 |
| Spicy food | 0.693 | 0.365 | 3.596 | 1 | 0.041 | 0.500 | 0.244 | 0.214 |
| Marital status | | | 14.435 | 2 | 0.001 | | | |
| Single | 19.181 | 17471.6 | 0.000 | 1 | 0.999 | 213846068.9 | 0.000 | . |
| Married | 22.707 | 17471.6 | 0.000 | 1 | 0.999 | 7270904337 | 0.000 | . |
| Weight | 0.063 | 0.022 | 8.108 | 1 | 0.004 | 1.065 | 1.020 | 1.113 |
| Age | 0.092 | 0.032 | 8.559 | 1 | 0.003 | 1.097 | 1.031 | 1.167 |
| Constant | -27.267 | 17471.6 | 0.000 | 1 | 0.999 | 0.000 | | |

B: Unstandardized beta, SE: Standard error, df: Degree of freedom, OR: Odds ratio, CI: Confident interval

## DISCUSSION

The prevalence of *H. pylori* infection as shown by large epidemiological prospective studies in an asymptomatic population and its prevalence in various upper gastrointestinal conditions has been reported in numerous countries throughout the world, including those in the South East Asia. *H. pylori* infection is etiologically associated with gastric cancer and peptic ulcer diseases which both are crucial public health burdens, which could be largely eliminated by *H. pylori* eradication. However, it is one of the most important risks of metaplasia and dysplasia in chronic atrophic gastritis despite the low prevalence of *H. pylori* in this region[11-14].

Apart from that our results illustrated that the both high and low-income group of people do not show any significant difference in association of gastritis as these people may have some common habits. However, the highest prevalence was observed in low-income households and people who are sharing sleeping accommodation, as risk-factors predisposing to infection[4,15]. Likewise, it has been suggested that the *H. pylori* infection is related to human poverty with distinct variances between advanced and emerging countries. It was revealed that socio-economic element and living standards are the main factors of the age-dependent attainment rate of *H. pylori* which consequently leads to its prevalence[16]. Studies have found that the prevalence of *H. pylori* colonization was approximately 24.3-49% in Malaysia based on histological assessment of samples attained via endoscopy and was reported higher among the Indians (61.8%) and Chinese (48.1%) ethnicities compared to Malay ethnicity (16.4%)[17-20]. Nevertheless, our current study revealed that the Malay ethnicity (which comprised half of the participants) has the highest percentage of gastritis 50.8% compared to others groups of ethnicities.

There was a significant and consistent difference in *H. pylori* infection prevalence rates among the various ethnic groups in Malaysia, being highest among the Indians followed by Chinese and unusually low in Malays[9]. However, the causes for this are unclear which may need more research on cultural and genetic factors to further help in understanding on the epidemiology and transmission of the infection. This study has given us the opportunity to investigate the risk factors and prevalence rate associated with *H. pylori* colonization among Malaysian adults residing in Selangor. This study was similar to previous studies which were conducted in Malaysia[16]. It is found that it was approximately 56.6% of total Malaysians were affected by *H. pylori* induced gastritis.

The prevalence infection of *H. pylori* data among the general Malaysian population were analyzed and it was reported that the prevalence increases with age (in people those are above 45 years old) in Indian and Chinese ethnicities followed by low education background group[20]. The current study results are in keeping with the previous studies, in which we found that the age, marital status and the weight of a person contributed in risk factors of having gastritis, however, we found no significant difference in both male and female participants as the cohort is small. Multivariate analysis shown that increase in age, weight, appetite with intake of oily and spicy food would increase the possibilities of *H. pylori* infection which subsequently result in gastritis. The bivariate data showed there is statistically significant association of gastritis with both spicy and oily food, however, failed to show any significance in multivariate which suggest it may not one of the main factors contributing in gastritis. We have also noted that marital status is one of the risk factors which contribute to gastritis. It is assumed that, it could be due to the high stress level which induced gastritis in married couples compared to those who are unmarried.

Another risk factor which contributing in gastritis was pointed out in some studies in which they reported that the smoking has been found to be related to a higher incidence of *H. pylori* in non-ulcer dyspepsia patients[21,22]. Similarly, bivariate analysis from the current results ($p = 0.05$) showed us significant association of gastritis with smoking, although there is no much variance between smokers and non-smokers. This could be due to increase in acid and pepsin

secretion which eventually change the gastric motility and disruption of gastric mucosal blood flow[4]. Apart from that, these results also indicated that the strong family history of gastritis was another contributory factor of gastritis. It was consistently reported that the Indians and Chinese have shown a higher prevalence of *H. pylori* induced gastritis compared to Malays which may suggest that the higher infection rates in their countries of origin and that the original migrants passed the infection rates to their generations of children who are born in Malaysia[8,20,23,24].

In the present study, bivariate data proposed no significant variances between tea and non-tea drinker (94 vs.146) but showed some significant association of coffee drinker with gastritis ($p = 0.001$). Bivariate analysis data illustrated the significant association of having gastritis with intake of coffee, however, it failed to show a significant association through multivariate analysis which suggest that it could be associated with gastritis but may not be one of the main contributing factors correlated to gastritis. Poor oral hygiene or dental plaque have also shown to be statistically significant association with gastritis in bivariate data but failed to show significant variance in multivariate which proposed that it is less likely contributing as a main factor in gastritis.

In this study, hot food and spicy food were statistically significant and associated with having gastritis in the bivariate analysis but it failed to have a significant factor in the final model in the multivariate. It means that hot food and spicy food have significant association with having gastritis but were not from the most important factors related and contributed with gastritis. Besides that, a variation in meal timing over a prolonged period appears to be associated with increased risk of symptomatic *H. pylori* infection and gastritis[25]. Regular timing of meals may play an important role in the prevention of these two medical conditions as there is a scarcity of published data studying on association between irregular meal timing and *H. pylori* and gastritis, nevertheless, there is need for more prospective research to determine the effect of irregular meals on the development of gastritis and *H. pylori*[26].

It has been concluded that the *H. pylori* infection is a common severe chronic infection with a high occurrence globally. Malaysia was also found to be one of the highest prevalence of *H. pylori* infection in South-East Asia region. There are few contributing factors which were found to be associated with gastritis induced *H. pylori* which are the family history, marital status, weight, spicy food and age as they were the most predictable factors. However, there are limitations of the study which need to be taken in count. Therefore, we need further study on a larger sample of cohort which involving people from different ethnicities and states with no age range.

## SIGNIFICANCE STATEMENT

This study found prevalence of gastritis was high among the urban population in Malaysia. It was revealed that family history, marital status, weight and age were the most important predictable factors that are associated with gastritis. It is beyond the scope of this study to explore all the potential factors which may contribute to gastritis due to time constrain. The future study can be done on diverse culture studying on different factors contributing in frequency occurrence of gastritis and this, will shed some lights to discover the critical areas of gastritis and the prevention that many researchers were not able to explore.

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