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Original Article

Helicobacter pylori Infection and Associated Risk Factors in Patients with Upper Gastrointestinal Symptoms

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ABSTRACT

Background: *H. pylori infection is the most common chronic bacterial infection in the world which can result in various gastrointestinal diseases, ranging from inflammation to even malignancy. Its prevalence is higher in developing countries, especially in lower socioeconomic groups. This study aimed to establish the prevalence of H. pylori infection in symptomatic patients and its relationship with various risk factors specially smoking, alcohol and socioeconomic status.* ***Methods:*** *A prospective cross-sectional study was done in symptomatic patients undergoing gastroduodenoscopy, to assess the prevalence of H. pylori and its associated risk factors in a tertiary care hospital of South Delhi. The gold standard diagnosis of H. pylori infection was histologic presence of the bacteria in the gastric biopsy. The variables analyzed as possible risk factors included demographic and living characteristics, socioeconomic status, smoking, alcohol, and clinical indications of H. pylori infection.* ***Results:*** *A total of 70 patients with upper gastrointestinal symptoms were included in the study. On histopathology, 51were found positive for H. pylori infection with a prevalence of 72.86%. No statistically significant difference was found between the H. pylori infection and socioeconomic status. H. pylori infection was found to be statistically significant for subjects who consumed alcohol (93.3%, p=0.046). They had 6.67 times risk of developing H. pylori infection compared to non-alcoholics. There was no significant association of H. pylori infection among the smokers and the non-smokers.* ***Conclusions:*** *There was no significant relationship between smoking, tobacco consumption, socioeconomic status and H. pylori infection. However, alcohol consumption (93.3%, p=0.046) and non-vegetarian diet (80%, p=0.01236) showed a higher significant association with active infection.*

Section - Pathology

Key words: *: H.pylori, gastrointestinal diseases, malignancy.*

INTRODUCTION

H. pylori infection is the most common chronic bacterial infection in the world predominately affecting the gastrointestinal tract and also the first formally recognized bacterial carcinogen by the World Health Organization.[1] Its infection represents a key factor in the etiology of various gastrointestinal diseases, ranging from chronic active gastritis to peptic ulcer, gastric adenocarcinoma, and gastric mucosa-associated lymphoid tissue lymphoma [MALT] leading to considerable morbidity and mortality.[2-4]

The global prevalence of *H.pylori* infection is more than 50%.[5] It has been suggested that Asians carry higher prevalence of *H.pylori* infection and likewise the infection is more frequent in less developed countries like Pakistan, India and Bangladesh.[6] The prevalence of *H.pylori* infection in the Indian population ranges from 31 to 84% or more in rural areas and the prevalence among children and adults is 87% and 88% respectively.[7] More than 20 million Indians are estimated to suffer from peptic ulcer disease, which is the most common recognized manifestation of *H.pylori* infection in India.[8,9]

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There are various known risk factors (age, gender, blood group) that play an important role in the transmission of *H. pylori* in the population thus enhancing the susceptibility of an individual to the infection.[3] It is worth considering that the risk factors for *H. pylori* infection, especially in the Indian context of environmental factors and personal habits have not been comprehensively investigated.

In particular, it is unclear whether smoking, alcohol consumption and socioeconomic conditions are independent predictors of infection. On search of literature, we did not come across any such study conducted in India to assess the relationship between symptomatic patients with *H. pylori* and specific risk factors such as smoking and alcohol.

Hence the present hospital-based cross-sectional study was done on patients undergoing endoscopy for upper gastro-intestinal disorders and the prevalence of H. *pylori* was estimated. Other parameters like socio-economic status, age, gender, diet, smoking, tobacco and alcohol consumption were also studied and association of H. *pylori* with these risk factors, if any, was identified. It is of utmost importance as identification of these specific risk factors may lead to the development of practical and effective preventive strategies against the *H. pylori* infection.

METHODS

Study design

A prospective cross-sectional study to assess the prevalence of *H. pylori* and its associated risk factors, was conducted in the teaching hospital of a new medical college catering to the urban slums of South Delhi. This study was conducted over a period of two months and the study population comprised of patients who were advised endoscopy for upper gastrointestinal symptoms. Sample size comprised of seventy patients and informed consent was obtained from all the study participants after explaining them about the research protocol. The study was approved by the institutional ethics committee.

Case selection-

All patients presenting with recurrent upper gastro-intestinal tract symptoms of more than one-month duration were enrolled for the study. Patients who were excluded from the study were

- Patients in whom biopsy specimen could not be obtained or was inadequate to comment.
- Patients who gave history of intake of proton pump inhibitors, NSAIDs, H2-blockers in past one month.
- Patients who had ever received *H. pylori* eradication therapy.

Data collection

Data regarding *H. pylori* infection was collected through a predesigned, semi-structured bilingual (English, Hindi) questionnaire. It was administered in a one-on-one participant interview basis and confidentiality was maintained. Patients were asked to fill the questionnaire which comprised of various items that were suspected to be potentially related to *H.pylori* infection, including diet, smoking and alcohol consumption. Demographic details and history of personal habits like smoking, tobacco use and alcohol consumption were documented in the form of questionnaire consisting of two sections. Section A which dealt with the socioeconomic status and demographic details of the participant (age, gender) and personal habits. Section B dealt with the symptoms of *H.pylori* infection and previous use of Non-steroidal anti-inflammatory drugs(NSAIDs), Proton pump inhibitor therapy etc. After the completion of questionnaire, patients were taken up for the Upper Gastro-Intestinal (UGI) Endoscopy.

Biopsy Sample Collection-

After informed written consent, endoscopy was performed via a flexible video gastroduodenoscope by the same single trained endoscopist to minimize the variability and observational bias in endoscopic procedure. Samples to assess *H.pylori* infection were taken. A total of four biopsies were obtained -two from antrum and two from corpus and were sent to the histopathology lab in different vials labelled according to the site of the sample.

Processing of Specimen-

Biopsy samples were immediately fixed in 10% formalin and then routinely processed and paraffin embedded. After section cutting, slides were stained both by H&E stain and Giemsa stain. These stained slides were assessed for the presence or absence of *H.pylori* by a single trained histopathologist. Histologic presence of bacteria in the gastric biopsy was considered as the Gold standard for the diagnosis of *H.pylori* infection. Histopathology also provided additional essential information on the status of the mucosa such as the presence of acute or chronic inflammation, lymphoid aggregates, intestinal metaplasia and glandular atrophy.

Statistical Analysis–

- The histopathological data was collected and analyzed for the prevalence of *H. pylori* infection amongst the study participants. Analysis was also done for the association between upper gastrointestinal symptomatology and various risk factors under study, i.e. age, gender, use of tobacco, alcohol, smoking and socio- economic status.
- Odds ratio was used to study the presence of association and Chi-square test was applied to study the significance of association amongst the various factors and *H. pylori* infection.

RESULTS

Prevalence and Demographic characteristics

A total of 70 patients with upper gastrointestinal disorders underwent endoscopy during the study period from June to July 2016. Study population comprised of 35 males and 35 females. Their age ranged from 15-70 years with a mean age of 35.6 year as shown in Table 1. On histopathology, out of 70 subjects, 51were found positive for *H.pylori* infection with a prevalence of 72.86%. (Figure 1).

Figure 2 shows the gender wise distribution of *H.pylori* seropositivity which constitute 27 (52.94%) males and 24

(47.06%) females (OR=1.537). However, no significant differences in the prevalence of *H.pylori* infection by gender were noted (P = 0.3).

The data when analyzed age wise, significant prevalence was observed in age group 15-25(p=0.02835) in which 16 (84.2%)were positive out of 19 subjects. Least prevalence was seen in age group 55-65, where only 2(25%) out of 6 were positive (Figure 3).

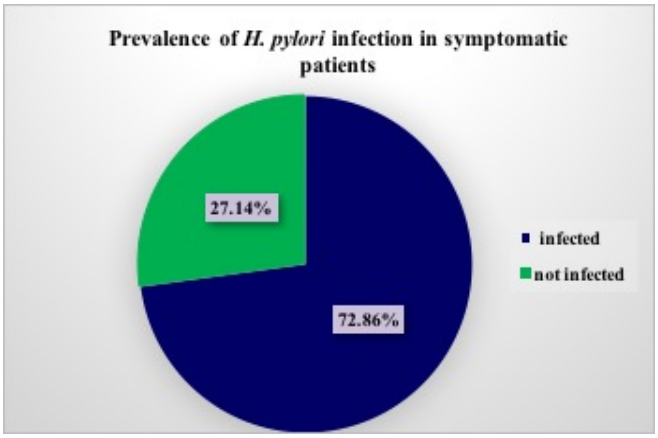

Figure 1: Prevalence of H. pylori infection in symptomatic patients

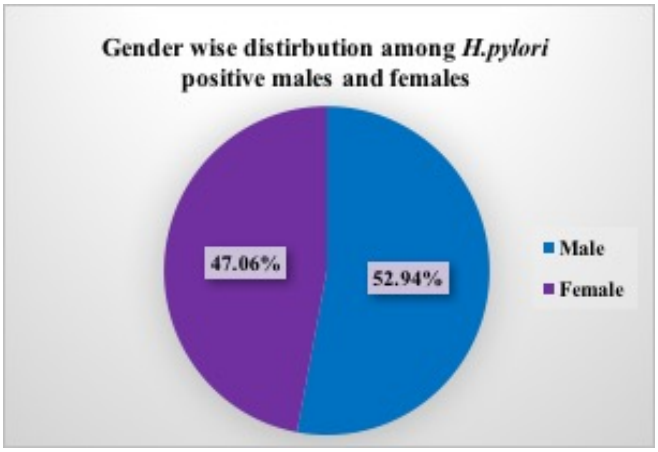

Figure 2: Gender-wise distribution among *H.pylori* positives males and females

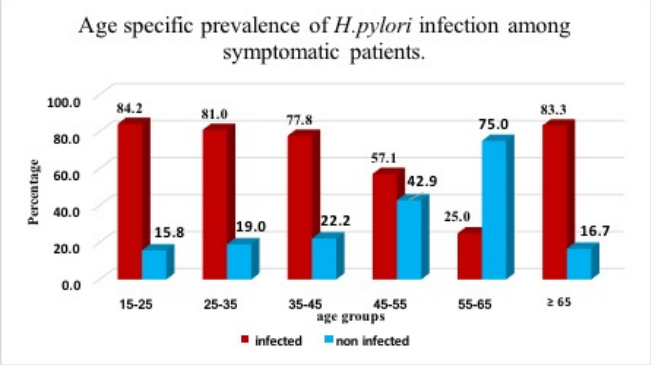

Figure 3: Age-specific prevalence of *H.pylori* infection among symptomatic patients

Socio-economic status and Dietary factors

No statistically significant difference was found between the *H.pylori* infection and socioeconomic status based on education, employment, income, persons per household and per room and water sources. However, there was a significant relation observed between dietary factors(p=0.01236). Our study showed that non vegetarians (80%) have higher risk of *H.pylori* infection(OR=4.451) as compared to vegetarians. (Table 2).

Personal Habits

Table 3 suggests that *H.pylori* infection is statistically significant for subjects who consumes alcohol (93.3%, p=0.046). They have 6.67 times risk of developing *H.pylori* infection compared to non-alcoholics. Whereas, there was no significant association of *H.pylori* infection among the smokers and the non-smokers (p=0.09267) and tobacco and non-tobacco chewers(p=0.09267). Similarly, there was no significant relationship observed between *H.pylori* infection and the frequency of risk factors. (Table 4)

Table 1- Age and sex characteristics of study participants

Variables	*Infected (n, %)*	*Not infected (n, %)*	*Total*	*p value*
Sex				0.2954
Male	27(77.1)	8(22.9)	35	
Female	24(68.6)	11(31.4)	35	
Age				**0.02835**
15-25	16(84.2)	3(15.8)	19	
25-35	17(81.0)	4(19.0)	21	
35-45	7(77.8)	2(22.2)	9	
45-55	4(57.1)	3(42.9)	7	
55-65	2(25.0)	6(75.0)	8	
≥ 65	5(83.3)	1(16.7)	6	

DISCUSSION

The prevalence of Helicobacter pylori infection varies worldwide, but higher colonization rates have been seen in developing countries, compared to developed countries. This study was conducted to find out the prevalence of *H.pylori* infection among symptomatic patients undergoing upper GI endoscopy and to determine the association of risk factors to active infection with special emphasis on smoking, alcohol consumption and socioeconomic status.

In a study conducted by Munish Rastogi et al in a tertiary care hospital in India, 208 individuals were screened for Helicobacter pylori which was positive in 44.23 % of asymptomatic individuals.[10] The overall prevalence recorded in our study was 72.86% which is higher in comparison to the above study. This high prevalence can be explained by the fact that we have estimated prevalence of *H.pylori* infection in symptomatic patients only. Moreover, prevalence varies widely by geographic area, age, race, ethnicity, lifestyle factors and socioeconomic status. These results are slightly similar to the study of Hamid *et al* which reported 74.7% frequency of *H.pylori* infection.[11]

Table 2. Association of *H. pylori* infection with sociodemographic factors among study population.

Variables	*Infected (n, %)*	*Not infected (n, %)*	*Total*	*P value*
Education				0.8392
Illiterate	19(67.9)	9(32.1)	28	
Elementary	15(78.9)	4(21.1)	19	
High school	13(72.2)	5(27.8)	18	
University	4(80)	1(20)	5	
Employed				0.4601
Yes	23(71.9)	9(28.1)	32	
No	28(73.7)	10(26.3)	38	
Income				0.8701
<10000 (lower middle class)	29(70.7)	12(29.3)	41	
10-50000 (upper middle class)	18(75.0)	6(25.0)	24	
>50000 (upper class)	4(80)	1(20)	5	
Persons per household				0.8086
1-5.	22(73.3)	8(26.7)	30	
5-10.	24(70.6)	10(29.4)	34	
>10	5(83)	1(17)	6	
Persons per room				0.125
<3	28(67)	14(33)	42	
≥3	23(82)	5(18)	28	
Water source				0.61
Pipe	39(76.5)	12(23.5)	51	
Well	4(66.7)	2(33.3)	6	
Public tap	5(55.6)	4(44.4)	9	
Tanker	3(75)	1(25)	4	
Diet				**0.01236**
Vegetarian	7(46.7)	8(53.3)	15	
Non-vegetarian	44(80)	11(20)	55	

Table 3. Analysis of personal habits and their association with H.pylori infection among symptomatic population.

Variables	*Infected (n, %)*	*Not infected (n, %)*	*Total*	*P value*
Tobacco				0.09267
Yes	15(88.2)	2(11.8)	17	
No	36(67.9)	17(32.1)	53	
Smoking				0.09267
Yes	15(88.2)	2 (11.8)	17	
No	36(67.9)	17(32.1)	53	
Alcohol				**0.04607**
Yes	14(93.3)	1(6.7)	15	
No	37(67.3)	18(32.7)	55	

In the present study, among Helicobacter pylori positive patients 77.1% were males and 68.6% were females. Although there is a slightly greater male preponderance but the difference between the genders was not significant which goes in accordance with a similar study of Kate et al from South India and from other parts of the world.[12,13] On the contrary, a cross sectional study of Valliani *et al* in Pakistan revealed substantial prevalence of *H.pylori* in asymptomatic patients with females being more affected than males.[4]

Table 4. Relationship between frequency of smoking, tobacco and alcohol consumption and H. pylori infection

Variables	*Infected (n, %)*	*Not infected (n, %)*	*Total*	*P value*
Smoking				0.5583
Sometimes	3(100)	0(0)	3	
Weekly	5(100)	0(0)	5	
Regularly	3(75)	1(25)	4	
Chain smoker	4(80.0)	1(20.0)	5	
Tobacco				0.06109
Everyday	9(100)	0(0)	9	
Weekly	4(100)	0(0)	4	
Monthly	1(50)	1(50)	2	
Rare	1(50)	1(50)	2	
Alcohol				0.5433
Everyday	4(80)	1(20)	5	
3-5 weekly	3(100)	0(0)	3	
Once a week	4(100)	0(0)	4	
Weekend	3(100)	0(0)	3	

In our study, age wise distribution showed maximum prevalence in the age group of 15-25 years (84.2%) followed by >65years (83%) and minimum in the age group of 55-65 (25%). In contrast, a similar Indian study conducted by Rajesh Kumar *et al* showed maximum prevalence in the age group of 36-45 years (43.47%) and minimum in the age group of 66-75 years (3.26%).[14] In accordance to our study, an increase in prevalence with age, being maximum (74%) between 16-30 years and thereafter showing a slight decline has been reported in another Indian study by Kate et al.[12]

A higher prevalence of *H.pylori* was noticed by Munish Rastogi *et al* in low socioeconomic classes with poor sanitation practices and unhygienic water supply. Similar results were observed recently by Laszewicza *et al*,[15] Hu D *et al*[16] and Zaterka S *et al*[17] that crowding, type of drinking water, lack of toilet during childhood, lower family income, and lower educational level has a positive association. In contrast, our study found no association between *H.pylori* and socioeconomic status. This could be because of the higher prevalence of *H.pylori* in the study population irrespective of the socioeconomic status.

We observed a higher association between *H.pylori* and non-vegetarian diet with a prevalence of 80%. Non vegetarian diet have been studied as a risk factor for peptic ulcer and gastric cancer by Epplien *et al*[18] and Munish Rastogi.[10] If this is true, targeted dietary intervention studies among high-

risk individuals such as those harbouring the most virulent forms of *H.pylori* may be the most effective study design for the reduction of the morbidity and mortality from this important disease. But still more studies are required to establish an association between them.

Several studies have assessed the possible association between *H.pylori* and cigarette smoking. In the majority of cross-sectional studies, no relationship between smoking and *H.pylori* infection was found as given by Rosenstock *et al*[19]; Moayyedi *et al*[20]; B Sharma *et al*[21] and Alsaimary *et al*[22] However, our findings were contrary to the findings of Ghosh *et al*[23]; Rajashekhar V et al[24] and Parasher G et al[25] who produced a positive finding and others that found a negative relationship between smoking habit and *H.pylori* seropositivity.[26] In the present study, the prevalence of Helicobacter pylori among smokers was observed to be higher (88.2%) than non-smokers (11.8%) but the difference was not statistically significant. Nicotine may alter gastric mucosal blood flow, mucus secretion and epidermal growth factor secretion that may facilitate colonization following exposure to the organism. Conversely, the result may be due to confounding factors, mainly those related to socioeconomic class, education grade and sanitary conditions.

In our study, no association were seen between tobacco consumption and *H.pylori*. In contrary, Fernando *et al* observed a significant higher proportion of *H.pylori* infection in tobacco chewers compared to nontobacco chewers among 173 subjects of Srilanka.[27] As far as we are aware the interaction between betel chewing and colonization by *H.pylori* as hitherto has not been investigated widely.

Several cross-sectional studies have investigated the relationship between alcohol consumption and *H.pylori* infection. Some studies reported a significantly inverse association with *H.pylori* infection.[26] while others found no significant association.[19,20] The findings of studies from Germany[28] and Greece[29] suggest that an inverse relationship exists between alcohol consumption and *H.pylori* infection. Some results indicate that consumption of moderate amounts of alcohol in the form of wine, beer and spirits may protect against *H.pylori* infection. Two mechanisms may explain the negative relationship. Firstly, alcohol may exert an anti-bactericidal effect against new infection. Secondly, alcohol may be bactericidal against existing *H.pylori* infection.

Interestingly, in the present study, we found that non-drinkers exhibited a significantly lower rate of *H.pylori* infection[26] compared with drinkers, demonstrating a positive association, which is in opposition to previously reported studies. Indeed, a previous study reported that heavy alcohol consumption favoured colonization of the gastric mucosa by *H.pylori*, although subjects reporting heavy alcohol consumption were both less educated and older, compared with those reporting no, mild or moderate alcohol consumption showing a positive association.[30] It is postulated that alcohol consumption facilitates *H.pylori* infection by damaging the gastric mucosa. However, other mechanisms may be involved in the synergistic effect, including bacterial adherence and host factors.

Early detection of *H.pylori* infected population and its eradication may result in significant improvement in severity of dyspeptic symptoms. Therefore, it is important to find out *H.pylori* prevalence and identify high-risk population, so that treatment strategies can be appropriately planned. This becomes even more important for those patients who are harbouring *H.pylori* but are asymptomatic.

However, there are a few limitations of this study. The study population was confined to only symptomatic patients undergoing endoscopy for recurrent gastrointestinal symptoms in a tertiary hospital, which limits the actual prevalence of *H.pylori* infections and do not totally reflect the number of infected individuals in the community. Other limitation of our study was that all information on personal habits was ascertained by a self-administered questionnaire without verification by biological markers. Moreover, we did not find statistically significant association of *H.pylori* with many of the postulated risk factors which can be attributed to the small sample size. Further studies involving larger numbers of subjects should address in more detail the impact of smoking, socioeconomic status and additional factors such as drinking and smoking patterns, type of alcoholic beverage consumed that might affect active *H.pylori* infection among adults.

CONCLUSION

The present study concludes that the prevalence of *H.pylori* infection is high (72.86%) among symptomatic patients. Age specific prevalence of active infection was higher in 15-25 age group and showed insignificant correlation between gender and infection. In symptomatic patients, there was no significant association between *H.pylori* infection and smoking, tobacco consumption and socio economic status. However, among the risk factors, alcohol consumption and non-vegetarian diet were the only variables which were statistically significant.

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