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African Journal of Microbiology Research

Full Length Research Paper

Screening for the prevalence of *Helicobacter pylori* infection among dyspeptic patients using simple fecal antigen and serum antibody diagnostic methods at Mukalla city Hospitals, Hadhramout, Yemen

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Helicobacter pylori **is the most common infection in the world, and the most main causes of dyspepsia are related to** *H. pylori* **infection. In that respect, several non-invasive methods for the diagnosis of** *H. pylori* **infection were utilized. The current study aimed to determine the prevalence of** *H. pylori* **infection and its associated variables among dyspeptic patients in Mukalla city, Hadhramout-Yemen during a period from February to September 2018. A cross-sectional descriptive study was conducted among 100 suspected dyspeptic patients. Data regarding to associated variables were collected using a structured questionnaire, and the samples of feces and serum were collected and screened for** *H. pylori* **by rapid diagnostic immunochromatographic assays for antigen and antibody. Data was analyzed using SPSS statistical software version 20 and a** *P* **value <0.05 was taken statistically significant. Prevalence of** *H. pylori* **was found to be 15 and 18.5% using the antigen** *H. pylori* **test and serum anti-***H. pylori* **test respectively. Prevalence using antigen** *H. pylori* **test was significantly associated to male sex (P=0.035). In those patients with** *H. pylori***, a positive result with antigen test was significantly associated to drinking non-filtered water (COR = 3.67; 95%CI=1.436-9.363; P=0.007), symptoms of heartburn and regurgitation (COR=0.865, 95%CI=0.034-0.536, P=0.004) and antibiotics used (COR=0.312, 95%CI=0.125-0.780, P=0.013). The prevalence of** *H. pylori* **infection was frequent among the dyspeptic patients in the study area.** *H. pylori* **infection was related to non-filtered water source, symptoms of heartburn and regurgitation and antibiotics used are contributing factors. Moreover, further studies are needed to investigate other potential associated variables for** *H. pylori* **infection.**

Key words: Antibody, antigen, dyspepsia, *Helicobacter pylori*, laboratory diagnosis, prevalence.

INTRODUCTION

Helicobacter pylori infects about 30-50% of the general population worldwide and its infection acquired during early childhood (Liu et al., 2017). *H. pylori* is recognized to play a causative role in the pathogenesis of various gastrointestinal diseases including peptic ulcer, chronic gastritis and it has been etiologically associated with

mucosa-associated lymphoid tissue (MALT) lymphoma and gastric carcinoma (Chandrababu et al., 2016; Nevoa et al., 2017).

Dyspepsia is a common health problem worldwide with an overall prevalence 25%. The diagnosis and management of dyspepsia causes a lot of economic burden worldwide (Naz et al., 20013). Dyspepsia symptoms often include epigastric pain, postprandial fullness, and/or early satiety. In dyspeptic patients without infection of *H. pylori*, it has been shown that ulcer disease is very rare and endoscopic examination is usually normal or shows evidence of oesophagitis (Wong and McLean, 2016). Dyspepsia also is a common presenting complaint of various upper gastrointestinal disorders. There are many causes of dyspepsia and the major ones include peptic ulcer disease (PUD), gastroduodenitis, esophagitis, malignancies, parasitic infection and dyspepsia (Ayana et al., 2014).

Although the route of transmission of *H. pylori* infection is not clearly known, some evidences indicate the main route is by contaminated water and food and faecal-oral transmission (Shiferaw and Abera, 2019), but it is not clear if specific foods can increase the risk of *H. pylori* infection or not (AlKalbani et al., 2016). *H. pylori* infection is apparent significantly higher in the developing countries than in the developed countries and the distribution varies between geographical locations and different communities (Lu et al., 2018). Most people get their primary infection of *H. pylori* during the childhood stage and stay infected during their life time (Atherton and Blaser, 2009). Also, there is no agreeable on the state of being male or female as a risk factor for *H. pylori* infection, but the physiological differences between male and female may affect the mechanism of immune response to the pathogenesis of bacteria (Ibrahim et al., 2017).

Non-invasive diagnostic tests for detection the antigen and antibody directed against *H. pylori* are now available and these tests are valuable both for screening and evaluation of therapy (Lee et al., 2013), and these non-invasive tests are also easy and cheap to perform (Formichella et al., 2013). The advantage of antigen detection test is to evaluate the eradication of *H. pylori* infection. However, if antigen concentration becomes low, false negative results may be reported. Fecal antigen detection *H. pylori* has certain disadvantages like antigen excretion may vary over the time period and may degrade while passing through the intestine (Patel et al., 2014).

In countries with low socioeconomic status like Yemen, there is poor personal hygienic practice, poor waste disposal system, crowded living conditions and lack of clean and safe water which are known to make individuals susceptible for *H. pylori* infection. Currently, large groups of populations predisposing to several risk factors of *H. pylori* infection. So, the prevalence and the epidemiological patterns of *H. pylori* infection varies greatly among societies and geographical locations. On a wider level, there is continuing need for numerical data on *H. pylori* infection distribution, its determinant and potential risk factors associated it in order to identify priorities for the health services in the community. On the other hands, studies on prevalence of *H. pylori* infection are important to design the appropriate interventions strategies. Therefore, the current study was aimed to evaluating the potential associated variables with the prevalence of *H. pylori* infection among dyspeptic patients by using fecal antigen and serum antibody diagnostic methods in Mukalla city hospitals, Hadhramout Governorate, Yemen.

PATIENTS AND METHODS

Study design and study population

This cross-sectional descriptive study was conducted among suspected cases of patients complaining of dyspepsia referred to some main hospitals in Mukalla city, Hadhramout governorate, Yemen during a period from February to September 2018.

Inclusions criteria

The patients showing symptoms of dyspeptic disorders were included in this study. Dyspepsia was defined as the presence of 2 or more of the following symptoms; heartburn, acid regurgitation, increased abdominal bloating, nausea, feeling of abnormal or slow digestion, or early satiety (Duvnjak, 2011).

Sample size calculation

The following formula was used for the sample size calculation (Samson et al., 2018):

$$n = (1.96)^2 \, pq \, / \, d^2$$

Where:

n = required sample size
p = proportion of the population having *H. pylori* infection from previous study
q = 1 - p
d = the degree of precision

For the calculation, a 95% confidence interval, P of 0.375, that is, a prevalence rate of 37.5% from previous study by Moharram et al. (2015) and margin of error (d) set at 0.05 was used to determine the minimum sample size required. To minimize errors arising from the likelihood of non-compliance, 15% of the sample size was added to obtain the final sample size. Therefore, a convenience sample of 100 suspected dyspeptic patients were included in the study and examined for *H. pylori* fecal antigen and anti-*H. pylori* serum rapid tests.

Data collection tool

A standardized, interviewer-administered, structured questionnaire was developed to obtain data regarding *H. pylori* infection associated variables. It consisted of systematic questions on demographic variables of gender, age groups, educational level,

monthly income level and family size; personal habits and hygienic behavior variables of food patterns, water sources and smoking; clinical variables of symptoms associated with infection and antibiotics drug used. The questionnaire filled with the aid of an interviewer.

Laboratory analysis

One step *H. pylori* antigen test is a rapid, serological, immunochromatographic assay supplied by InTec Products, INC, USA for detection of *H. pylori* antigen in human feces sample. The test is used to obtain a visual, qualitative result with a high sensitivity 98.4% and specificity 98.6% as per manufacturer's specifications. When feces sample is added to sample pad, it moves through the conjugate pad and mobilizes gold anti-*H. pylori* conjugate that is coated on the conjugate pad. The mixture moves along the membrane by capillary action and reacts with anti-*H. pylori* that is coated on the test region. If *H. pylori* is present, the result is the formation of a colored band in the test region. If there is no *H. pylori* in the sample the area will remain colorless. The sample continues to move to the control area and forms a pink color which indicating the test is working and the result is valid.

Serum anti-*H. pylori* was detected using a one-step anti-*H. pylori* test cassette supplied by InTec Products, INC, USA. The advanced quality rapid anti-*H. pylori* test is a colloidal gold enhanced test detect antibodies in human. The test is based on immunochromatography and can give a result within 20 min with a high sensitivity of 94.88% and specificity of 95.21% as per manufacturer's specifications. The test is used for the rapid visual qualitative detection of antibodies to *H. pylori* in human serum, plasma or whole blood. The procedures followed the manufacturer's instructions. In brief, 100 µl of sample or control was dispensed into the circular sample well on the card, then the test results interpreted at 15-20 min.

Ethics approval and consent to participate

Research ethical approval of this study was obtained from Hadhramout University, Faculty of Sciences. Written consent was obtained, meeting No. HU/FOS/P1/11/2017, date 12/11/2017 before commencing the study. Permission letter was obtained from the hospital's administrations. The information was taken from the participants after they agreed to it verbally according to the informed consent with confidentiality of each study participant's result.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 20 was used for data analysis. The association between different variables and outcome of *H. pylori* infection was calculated and compared using Pearson Chi-square (χ2) test. Binary and multiple regression tests (crude odds ratio/adjusted odds ratio) were used to detect independent predictors of *H. pylori* positivity in dyspeptic patients. The level of statistical significance was set at p-value < 0.05.

RESULTS

Socio-demographic characteristics of study participants

A total of 100 suspected dyspeptic patients participated in this study. Majority of the study participants were females

53%. The mean age of participants was 25.7±15.0 SD (age range 5-60 years old). Regarding to educational status, primary and high school accounted for the highest percentage, 35 and 26% respectively. About 83% of the participants had a medium monthly income. Family size of 6-8 persons was the highest percentage 44% as demonstrated in Table 1.

Prevalence of *H. pylori* infection and associated variables

Prevalence of *H. pylori* was found to be 15 and 18.5% using the antigen *H. pylori* test and serum anti-*H. pylori* test respectively. The highest prevalence of *H. pylori* infection was seen among the males than the females 63% vs 37% by antigen test with the difference was statistically significant (COR=0.386, 95%CI=0.160-0.934, *P*=0.035), and 57% vs 43% by antibody test, but the difference was not statistically significant (*P*=0.136). The highest percentage, 40.0% of *H. pylori* infections was noticed in the age group of 19-32 years old participants, followed by the age group of 33-46 years old 33.0% for antigen test, whereas the highest percentage, 38.0% of *H. pylori* infections showed in the age group of 33-46 years old participants, followed by the age group of 19-32 years old 35.0% for antibody test with no difference significant associated. Regarding the educational status, the primary and high school levels are the majority groups who come up positive for *H. pylori* both in the antigen and antibody tests than others with no statistically significant difference (*P* > 0.05). Prevalence of *H. pylori* infection was higher among medium income level participants, and number of family members of 6-8 and more than 9 persons showed high infection with *H. pylori* both in the antigen and antibody tests with no statistically significant difference (*P* > 0.05). In those patients with *H. pylori,* a positive result with antigen test, non-filtered water source had 3.667 times risk of getting *H. pylori* infection (95%CI=1.436-9.363, *P*=0.007) and not significant for positive result of antibody test. Also, food pattern and smoking were not associated with *H. pylori* infection (*P* > 0.05) for both positive results in the antigen and antibody tests. Clinically, the patients with heartburn, heartburn and regurgitation had come up with positive for the *H. pylori* antigen and antibody tests, and likewise, heartburn and regurgitation are significantly associated (COR=0.865, 95%CI=0.034-0.536, *P*=0.004) for antigen test, and antibody test (COR=0.676, 95%CI=0.103-1.015, *P*=0.053). Patients with *H. pylori* positive result with antigen test, antibiotics used is significant associated (COR=0.312, 95%CI=0.125-0.780, *P*=0.013), but not significant with a positive result with antibody test (*P*=0.138) as shown in Tables 2 and 3.

Multivariate logistic regression analysis was performed for these associated variables that showed significant at the crude odds ratio calculation for fecal antigen test. The association remains significant between *H. pylori*

Table 1. Socio-demographic characteristics of suspected dyspeptic patients attending the hospitals at Mukalla city, Hadhramout, Yemen.

Variable		Frequency	Percentage
Gender	Male	47	47
	Female	53	53
Age group (years)	5 - 18	3	3
	19 - 32	38	38
	33 - 46	37	37
	47 - 60	22	22
Educational level	Primary	35	35
	High school	26	26
	University	16	16
	Postgraduate	1	1
	Illiterate	22	22
Income level	High	1	1
	Medium	83	83
	Low	16	16
Family size (person)	3 - 5	28	28
	6 - 8	44	44
	9 and more	28	28

Table 2. Fecoprevalence of *H. pylori* infection and its associated variables among the dyspeptic patients.

Variable		No. of cases	Positive fecal Ag(%)	COR	CI(95%)	p-value
Gender	Male	47	19(63.0)	0.386	0.160-0.934	0.035*
	Female	53	11(37.0)	1	1	
Age group (years)	5 - 18	3	1(3.0)	0.067	0.072-12.105	0.958
	19 - 32	38	12(40.0)	1.011	0.327-3.124	0.985
	33 - 46	37	10(33.0)	1.260	0.397-3.995	0.695
	47 - 60	22	7(24.0)	1	1	
Educational level	Primary	35	6(20.0)	1.813	0.501-6.556	0.365
	High school	26	10(33.0)	0.4	0.176-2.046	0.414
	University	16	7(24.0)	0.518	0.123-1.883	0.294
	Postgraduate	1	1(3.0)	0.000	0.000	1.000
	Illiterate	22	6(20.0)	1		
Income level	High	1	0(0.0)	372801891.8	0.000	1.000
	Medium	83	27(90.0)	0.521	0.126-1.822	0.280
	Low	16	3(10.0)	1		
Family size (person)	3 - 5	28	6(20.0)	2.037	0.621-6.686	0.241
	6 - 8	44	14(47.0)	1.190	0.438-3.236	0.733
	9 and more	28	10(33.0)	1		
Food pattern	Fatty, citrus and spicy	93	27(90.0)	1.833	0.384-.8.746	0.447
	Nothing	7	3(10.0)	1		

Table 2. Cont'd.

Water source	Non filtered	48	8(27.0)	3.667	1.436-9.363	0.007*
	Filtered	52	22(73.0)	1		
Behavior	Smoking	11	4(13.0)	0.278	0.195-2.678	0.627
	Nothing	89	26(87.0)	1		
Clinical symptoms	Regurgitation	4	0(0.0)	269245810.7	0.000	0.999
	Heartburn	37	6(20.0)	0.139	0.258-5.219	0.845
	Heartburn and regurgitation	38	21(70)	0.865	0.034-0.536	0.004*
	No symptoms	21	3(10.0)	1		
Antibiotics used	Used	29	14(47.0)	0.312	0.125-0.780	0.013*
	Non-used	71	16(53.0)	1		

*Significant statistics at p-value <0.05; COR, Crude Odds Ratio; CI, confidence interval.

infection, gender, non-filtered water source, symptoms of heartburn and regurgitation and antibiotics used as given in Table 4.

DISCUSSION

H. pylori is a common health problem worldwide and its infection is an important public health in developed and developing countries (Ozbey and Hanafiah, 2017). Here in Hadhramout, Yemen to the best of our knowledge, no data exist on the prevalence of *H. pylori* infection and associated risk factors. Therefore, the present study was designed to determine the prevalence of *H. pylori* infection and associated variables among dyspeptic patients in Mukalla city, Hadhramout governorate. In this study, the overall feco and seroprevalence of *H. pylori* infection was 15 and 18.5% which was similar to studies results of fecoprevalence *H. pylori* done in Iran 37.8% (Iranikhah et al., 2013), Nigeria 23.5% (Samson et al., 2018), Ethiopia 36.8% (Shiferaw and Abera, 2019). Similar results of seroprevalence *H. pylori* showed in Vietnam 48.8% (Nguyen et al., 2017), Nigeria 28.0 and 36.3% (Samson et al., 2018; Daniyan et al., 2020). However, the results obtained in this study is lower than those of previous studies of anti-*H. pylori* seropositivity 98% (Misganaw and Abera, 2017), 64.39% (Mabeku et al., 2018), 51.4% (Chukwuma et al., 2020), 73.11 and 58.05% for dyspeptic diabetic patients and non-diabetic respectively (Mabeku et al., 2020), and fecoprevalence 81.8% (Sabh and El-Less, 2017). The reason for this variation could be due to difference in sample size, diagnostic methods, sanitation practice level of individuals and communities, living conditions or low levels of exposure to the risk factors other than that included in our study. Moreover, some of the above studies used anti-*H. pylori* testing which may lead to over estimation of the infection prevalence.

In the current study, the proportion of *H. pylori* was higher in males than females, and the difference was statistically significant. Although the number of females was greater than males participants; this might be the reason why the prevalence of *H. pylori* in male participants was higher than females. We need further researches on gender specific *H. pylori* infection to explain the variation. This finding was consistent with previous studies (Broutet et al., 2001; Chandrababu et al., 2016; Ibrahim et al., 2017). In contrast, other studies showed that *H. pylori* infection was significantly higher in females than males (Samson et al., 2018; Mabeku et al., 2018). While some studies showed no relation observed between the gender and *H. pylori* infection in dyspeptic patients (Roland et al., 2016; Dilnessa and Amentie, 2017; Tameshkel et al., 2018).

Our study indicated high proportion of *H. pylori* infection in the age groups of 19-32 years and 33-46 years with insignificant difference. This was comparable to different previous studies (Zhu et al., 2014; Chandrababu et al., 2016; Mabeku et al., 2018; Alharbi and Ghoraba, 2019). Contrary to this, other studies reported the average age of infected patients of *H. pylori* in the age group of 40-49 years (Simón et al., 2016) and 50–59 years (Syam et al., 2015), other studies showed a predictor of *H. pylori* infection takes place early in childhood (Mabeku et al., 2018; Daniyan et al., 2020). Other studies showed no relation observed between age groups with *H. pylori* infection (Roland et al., 2016; Dilnessa and Amentie, 2017), while other studies revealed a statistically significant association between *H. pylori* positivity and age of patients (Moharram et al., 2015; Tameshkel et al., 2018).

In this study, primary and high school education level of participants accounts the majority positive for *H. pylori* with no significant association, and this comparable with

Table 3. Seroprevalence of *H. pylori* infection and its associated variables among the dyspeptic patients.

Variable		No. of cases	Positive serum Ab(%)	COR	CI(95%)	p-value
Gender	Male	47	21(57.0)	0.535	0.235-1.217	0.136
	Female	53	16(43.0)	1		
Age group (years)	5 - 18	3	2(5.0)	0.714	0.022-3.669	0.336
	19 - 32	38	13(35.0)	1.099	0.367-3.292	0.866
	33 - 46	37	14(38.0)	0.061	0.314-2.802	0.910
	47 - 60	22	8(22.0)	1		
Educational level	Primary	35	12(32.0)	1.327	0.442-3.985	0.614
	High school	26	7(19.0)	1.879	0.558-6.326	0.308
	University	16	8(22.0)	0.308	0.189-2.533	0.578
	Postgraduate	1	1(3.0)	0.000	0.000	1.000
	Illiterate	22	9(24.0)	1		
Income level	High	1	0(0.0)	1615474866	0.000	1.000
	Medium	83	29(78.0)	1.862	0.633-5.477	0.259
	Low	16	8(22.0)	1		
Family size (person)	3 - 5	28	9(24.0)	2.111	0.713-6.249	0.177
	6 - 8	44	14(38.0)	2.143	0.808-5.683	0.126
	9 and more	28	14(38.0)	1		
Food pattern	Fatty, citrus and spicy	93	33(89.2)	2.424	0.511-11.491	0.265
	Nothing	7	4(10.8)	1		
Water source	Non filtered	48	15(41.0)	1.613	0.709-3.669	0.254
	Filtered	52	22(59.0)	1		
Behavior	Smoking	11	5(13.5)	0.674	0.190-2.383	0.540
	Nothing	89	32(86.5)	1		
Clinical symptoms	Regurgitation	4	0(0.0)	646189945.7	0.000	0.999
	Heartburn	37	10(27.0)	1.080	0.328-3.560	0.899
	Heartburn and regurgitation	38	21(56.8)	0.676	0.103-1.015	0.053*
	No symptoms	21	6(16.2)	1		
Antibiotics used	Used	29	14(38.0)	0.513	0.213-1.240	0.138
	Non-used	71	23(62.0)	1		

*Significant statistics at p-value <0.05; COR, Crude Odds Ratio; CI, confidence interval

some studies showed low and high school educational level was more infected with *H. pylori* infection (Dilnessa and Amentie, 2017; Shiferaw and Abera, 2019), but the predictor of seroprevalence of *H. pylori* infection was found to be the illiteracy (Hamrah et al., 2017). This result could be due to the fact that low education level has a significant impact on personal and environmental hygiene and play a role in the prevalence of *H. pylori* infection.

In our finding, *H. pylori* infection was higher in medium–income households, which was incomparable with other reports that have identified low-income as a risk factor predisposing to *H. pylori* infection (Subsomwong et al., 2017; Mabeku et al., 2018; Shiferaw and Abera, 2019). Other studies revealed that the crowded household was a predictive factor for *H. pylori* infection (Nguyen et al., 2017; Bello et al., 2018; Gide et al., 2019).

In addition to fecal-oral transmission of *H. pylori*, source of drinking water has been noticed as one of the contributing risk factors for the high prevalence of *H. pylori* infection in developing countries, where there is a

Table 4. Adjusted odds ratio for gender, water source, clinical symptoms and antibiotics used with *H. pylori* infection among dyspeptic patients.

Variable		Fecal antigen test		
		AOR	CI(95%)	p-value
Gender	Male	2.591	1.071-6.267	0.035*
	Female	1	1	
Water source	Non filtered	0.727	0.107-0.696	0.007*
	Filtered	1	1	
Clinical symptoms	Regurgitation	-	-	-
	Heartburn	0.161	0.258-5.219	0.845
	Heartburn and regurgitation	7.412	1.866-29.444	0.004*
	No symptoms	1	1	
Antibiotics used	Used	3.208	1.283-8.024	0.013*
	Non-used	1	1	

*Significant statistics at p-value <0.05; AOR Adjusted odds ratio; CI, confidence interval

lack of access to clean water and poor sewerage system (Nurgalieva et al., 2002). The relationship between source of drinking water and *H. pylori* infection was statistically significant in this study. This result was similar to other previous studies (Subsomwong et al., 2017; Bello et al., 2018; Shiferaw and Abera, 2019; Chukwuma et al., 2020).

Individuals who regularly eat uncooked vegetables are more likely to be infected with *H. pylori* (Cover and Blaser, 2009). From this study, we investigated a particular type of food (that is, the spicy, citrus or fatty foods) was positively associated with *H. pylori* infection with no statistically significant difference. Some changes in the gastric mucosa may be associated with an increased chance of persistent infection with *H. pylori* such as the way in which food is prepared, and dietary administration of salt may induce mucosal damage and destroy the mucosal barrier in the stomach (Zhu et al., 2014). Some previous studies showed the prevalence of *H. pylori* infection was associated with the consumption of a particular type of food, in Yemen fat rich meals (Moharram et al., 2015), in Ethiopia coffee consumption and alcohol drinking (Dilnessa and Amentie, 2017), in Pakistan junk food and beverages (Gul et al., 2016), in China eating kipper and fried food (Zhu et al., 2014). A study conducted in Yemen revealed statistically significant association between *H. pylori* positivity with Qat chewing (Moharram et al., 2015), other study carried out in Ethiopia showed Qat chewing had no significant association with *H. pylori* infection (Dilnessa and Amentie, 2017). Other findings found agree with our results with no statistically significant association between *H. pylori* positivity and smoking (Zhu et al., 2014; Moharram et al., 2015; Dilnessa and Amentie,

2017), while other study showed a cigarette smoking was significant risk factor for infection of *H. pylori* (Bello et al., 2018).

In our results, the relationship of *H. pylori* infection prevalence with clinical symptoms of dyspepsia like heartburn and regurgitation were statistically significant associated. The data were confirmed by multivariate logistic regression analysis. Similar results of other studies revealed that *H. pylori* infection was associated with dyspepsia (Misganaw and Abera, 2017; Tameshkel et al., 2018; Borges et al., 2019; Mabeku et al., 2020). Other study showed the predictor of seroprevalence *H. pylori* was found to be epigastric pain (Hamrah et al., 2017). However, *H. pylori* is motile even in the highly viscous mucus layer, and it can evade gastric motility, peristalsis and gastric acidity. Although it is motile, it may adhere to the gastric mucosa through specific adhesion mechanisms, and secretion of large amounts of virulence factors such as urease, cytotoxins, proteases and phospholipases results in in the intense acidity of the stomach, cause local inflammation, attack and damage mucosal cell membranes (Shi et al., 2008). In some cases, *H. pylori* can be detected only in the stomach, particularly during proton pump inhibitors (PPIs) use (Wong and McLean, 2016). Antibiotics drug usage was statistically significant associated with *H. pylori* infection in the current study. Other agreement results showed that the antibiotics used was found to be significant risk factor for *H. pylori* infection (Moharram et al., 2015; Nguyen et al., 2017). Antibiotics resistance in *H. pylori* is an increasing trend because of the overuse and misuse worldwide of antibiotics for the treatment of other infections, especially in developing countries (Mégraud, 2013), and this is resulting in falling success rates of *H.*

pylori eradication treatment (Suzuki, 2019).

Limitations

The limitation of this study was the lack of a control (non-dyspeptic) group. The sample size of the study is relatively small. For diagnostic test involving sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy all these deal with how efficient a test must use the gold standard technique. Lack of advancing techniques such as invasive or molecular diagnostic methods. Using a cross-sectional descriptive study design impeding the determination of causality, therefore we anticipate that future studies with a longitudinal or survey study design over more extended periods of time.

Conclusion

The study revealed that the prevalence of *H. pylori* infection was frequent among the dyspeptic patients. Highly prevalence of *H. pylori* infection was found among males, the age groups 19-32 years and 33-46 years, primary and high school educational levels, medium monthly income level and overcrowded house. The prevalence of *H. pylori* infection was found significantly associated with gender. Also, heartburn and regurgitation, sources of drinking water and antibiotics drug used were statistically significant associated variables with *H. pylori* infection, while there was no statistically significant association between *H. pylori* positivity and type of foods and smoking. Non-invasive *H. pylori* testing cards was rapid, easy, inexpensive methods for detection *H. pylori* and important for screening the infection and epidemiological studies. Further longitudinal studies must do in depth using different diagnostic testing methods.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENTS

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