ORIGINAL ARTCLE

Magnitude of *Helicobacter pylori* among Dyspeptic Patients Attending at University of Gondar Hospital, Gondar, Northwest Ethiopia

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ABSTRACT

BACKGROUND: *Helicobacter pylori (H.pylori) infection is predominantly acquired in childhood from family members. The infection can cause dypepepsia, chronic and acute gastritis and gastric cancer. Dyspepsia is the most common illness in the Ethiopian population visiting outpatient department of health facilities, and it has also been associated with H.pylori infection. The aim of this study was to assess the magnitude of H.pylori and its associated factors among dyspeptic patients who visited University of Gondar Hospital Outpatient Department.*
MATERIALS AND METHODS: *An institutional-based cross-sectional study was conducted on 354 dyspeptic patients. A systematic random sampling technique was employed to select study participants. Data were collected by using structured questionnaire via face-to-face interview. H.pylori infection was diagnosed using stool antigen test method. The data were entered into Epi info version 3.5.3 and transferred to Statistical Package for Social Sciences version 20. Both Bivariable and multivariable binary logistic regression analyses were performed to see the effect of independent variables on the dependent variable.*
RESULT: *Of the total study participants, 201(56.8%), 195(55.1%) and 182(51.4%) were married, urban residents and females, respectively. The overall magnitude of H.pylori infection was 37.6%. In bivariable logistic regression analysis, sex and marital status were significantly associated with H.pylori infection, but in multivariable logistic regression analysis only marital status was significantly associated with H.pylori infection.*
CONCLUSION: *The magnitude of H.pylori infection is high indicating that it is a public health problem in the study to area. According to this study, none of the variables were significantly associated with H.pylori infection. Hence, effective preventive, control and screening strategies need to be designed to reduce the burden of the disease.*
KEYWORDS: *Associated factor, Dyspepsia, Helicobacter pylori*

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INTRODUCTION

Helicobacter pylori (*H.pylori*) is spiral shaped or curved rod gram-negative, micro-aerophilic with two to six lophotrichious flagella that gives it the motility to withstand rhythmic gastric contractions and penetrate the mucosa. The principal reservoir for *H. pylori* infection appears to be the stomach especially antrum (1). *H.pylori* infection is predominantly acquired in childhood from the family. The majority of infected people do not develop symptoms. However, the infection causes progressive damage to the lining of the stomach that may be irreversible. The infection always causes gastritis, which affects the gastric mucosa and may be associated with nausea (2). Chronic gastritis is primarily developed with *H.Pylori* colonization. The bacterium is also linked to the development of gastric ulcers, duodenal ulcers and stomach mucosal atrophy. Moreover, *H.pylori* is considered to be the leading carcinogen because chronic inflammation and atrophy can further lead to malignant transformation(3,4).

There are different factors that allow *H. pylori to* colonize and survive in harsh gastric environment of the host. Of these, the ability of the bacteria to produce large amounts of unease which hydrolyzes urea to ammonia and carbon dioxide, the presence of flagella which allow the bacteria to move, navigate, and persistently colonize the mucus layer of the gastric epithelium, and the ability of the bacteria to produce enzymes that break down the surfactant layer over the gastric epithelium which allows the bacteria to access nutrition are the major contributing factors of *H.pylori* pathogenesis (5).

H.pylori is one of the most common infectious diseases encountered in developing and developed countries (6). According to the World Gastroenterology Organization report, the prevalence of *H.pylori* in developed countries ranges from 20-50%. The infection has a higher prevalence rate in developing countries (80-95%). In Ethiopia, the prevalence is as high as 48% in children aged 2-4 year, 80% at the age of 6 year,

and above 95% in adults (7,8). The global prevalence of *H.pylori* infection is more than 50% with significant variation within and among countries. Sero-prevalence studies in different countries show that the epidemiology of the infection varies with the geographic location, ethnicity and demographic factors of the studied population. Furthermore, these studies reported that *H.pylori* sero-positivity rate increases progressively with age. Similarly, the rate of *H.pylori* infection can also be high in patients with stomach cancer; 75 % of all stomach cancer cases are infected (9,10). Differences in the rate of childhood acquisition of infection is probably responsible for the differences in the prevalence of infection between developed and developing countries. This could be due to disparities in socio-economic and living standards. High prevalence is an indication of a need for public health intervention (11).

No single factor can be the major determinant of *H. pylori* incidence and prevalence. However, poverty-associated factors are found to be major risk factors (12). A study conducted in Gondar revealed that alcohol intake and age are risk factors for *H.pylori* infection, but socioeconomic status requires further investigation (13). In developing countries, the required health finance is unaffordable to properly manage *H.pylori* infection, which results in diseases including peptic ulcer and gastric cancer (9). Planning preventive measures that reduce the burden of *H.pylori* infection in the community has paramount importance. In doing so, evidences on the magnitude and associated factor of *H.pylori* infection in various localities are mandatory to design intervention measures. Hence, this study is aimed to investigate the magnitude and associated factors of *H.pylori* infection among dyspeptic patients at the Outpatient Department of University of Gondar Hospital.

MATERIALS AND METHODS

Study area: The study was conducted at University of Gondar Hospital Outpatient Department, Gondar Town, Northwest Ethiopia. The town is found at 740 km from the capital city,

Addis Ababa, and 180 km from the capital city of Amhara Regional state, Bahir Dar. It is located at an altitude of 2200 meter above sea level and has average temperature of $20^{o}C$. The hospital provides teaching and referral services for more than 5 million people including inpatient and outpatient services. The study was conducted from March 1 to April 30, 2016.

Study population and sampling technique: Dyspeptic patients who attend at University of Gondar Hospital Outpatient Department during the study period and were willing to participate in the study were the study population. All dyspeptic patients who were clinically suspected for *H. pylori* infection and visited the outpatient department during the study period were included in the study. Patients who had been taking proton-pump inhibitor or other antibiotics against *H. pylori* within the last 2 weeks before data collection period were excluded from the study. Systematic random sampling technique was employed to select the study participants from their sequence of hospital visits. A total of 354 study participants were included in the study.

Data collection and laboratory method: Data on socio-economic, demographic and behavioral characteristics of the study participants were collected using structured pre-tested questionnaire via face-to-face interview. Approximately 2 gram of stool sample was collected from each participant in a clean container. *H. pylori* stool antigen was detected by Wondfo one step *H.pylori* feces test kit (Guangzhou Wondfo Biotech, China) according to the manufacture`s instruction.

Data analysis and interpretation: Data was cleared, entered into Epi info version 3.5.3 and transferred to Statistical Package SPSS version 20 software for analysis. Descriptive and summary statistics were carried out. Both bivariable and multivariable binary logistic regression model were fitted to identify associated factors of *H.pylori*. Odds ratio, and 95% CI for odds ratio were computed to assess the strength of association and statistical significance. Variables having p-value of less than 0.2 in the bivariable logistic regression analysis were fitted into the multivariable logistic regression model. Variables having p-value less than 0.05 in multivariable logistic regression model were considered to be statistically significant. The model fitness was checked by using Hosmore-lemeshow goodness of fit test.

Ethical consideration: The study was conducted after obtaining ethical clearance from the School of Biomedical and Laboratory Sciences. Official letter was submitted to the University of Gondar Hospital. The purpose of the study was explained for each study participant. The data was collected after informed consent was obtained from each study participant. The data was kept confidentially. The *H.pylori* stool antigen test results were communicated to the responsible physicians working at the outpatient department.

RESULT

Socio-demographic characteristics of study participants: A total of 354 dyspeptic patients were included in the study. About 201(56.8%), 195(55.1%) and 182(51.4%) of the participants were married, urban residents and females, respectively. About 132(37.3%) and 112(31.6%) of the study participants were below the age of 26 years and in the age ranges of 26-40 years, respectively. Of the total participants, 119(33.6%) and 105(29.7%) were educationally unable to read and write, and occupationally students, respectively. With regard to the family size, 143(40.4%) of them were living within the family having 1-4 members. About half of the participants had a family monthly income of less than 1000 Ethiopian Birr (Table 1).

Behavioral and hygiene practices of study participants: When we consider lifestyle and hygiene, 172(48.6%) had been drinking alcohol; of those only 39(11%) had been drinking more than three times per week. Nearly 256 (73.3%) of the subjects had habit of a hand washing both before meal and after visiting toilet, while the remaining 98(27.7%) were practicing either before meal or after visiting toilet. Seventy-one (20.1%) and 93(26.3%) the study participants used water from well and open sources, respectively.

Table 1: Socio-demographic characteristics of dyspeptic patients attending at University of Gondar Hospital Outpatient Department, 2016.

Variables		Frequency	Percent
Sex	Male	172	48.6
	Female	182	51.4
Age	<=25	132	37.3
	26-40	112	31.6
	>40	110	31.1
Residence	Urban	195	55.1
	Rural	159	44.9
Marital Status	Married	201	56.8
	Unmarried	153	43.2
Educational status	Unable to read and write	119	33.6
	Primary and secondary education	143	40.4
	Tertiary Education	92	26
Occupation	Student	105	29.7
	Farmer	59	16.7
	Housewife	90	25.4
	Government and private employee	76	21.5
	Others*	24	6.8
Monthly income in (ETB)	<1000	180	50.8
	1000-2999	126	35.6
	>=3000	48	13.6
Family size	1-4	143	40.4
	5-6	120	33.9
	>6	91	25.7

*Other occupation includes daily laborers, merchants and unemployed; Unmarried marital status includes single, divorced and widowed

Prevalence of *H.pylori* with respect to socio-demographic characteristics: The magnitude of *H.pylori* infection was assessed by considering the socio-demographic characteristics of the study participants. The study showed that high magnitude of *H.Pylori* infection was found in study participants who were male, 74(43%). Lower magnitude was observed among participants aged greater than 40 years. Regarding educational status and family size, 60(42%) of participants with primary or secondary educational attainment and 59(41.3%) of participants with family size of 1-4 members were positive for *H.pylori* (Table 3).

The magnitude of the infection was higher in participants who did not wash their hands both before meal and after toilet, 41(42%), and got drinking water sometimes from protected water sources and mostly from open sources, 11(47.8%). The positivity for *H.Pylori* infection in this study was similar between those who are alcohol consumers and those who do not use it (Table 4).

Factors associated with *H.pylori* infection: In bivariable binary logistic regression analysis, only sex was significantly associated with *H.pylori* infection. However, in multivariable binary logistic regression analysis, controlling the possible cofounders, it was not significantly associated with *H.pylori* infection (Table 5).

Table 2: Life style and hygiene related factors of dyspeptic patients who attended at University of Gondar Hospital Outpatient Department, 2016.

Variable		Frequency	Percent
Alcohol drinking	Yes	172	48.6
Habit	No	182	51.4
Frequency of	Not drank	182	51.4
alcohol intake	1 to 3 times	133	37.6
per week	>3 times	39	11
Type of alcohol	Non-drinker	182	51.4
	Local alcohol	119	36.6
	Beverages	21	5.9
	Both	32	9
Hand washing	Either before meal or after toilet	98	27.7
Habit	Both before meal and after toilet	256	73.3
Hand washing habit	Always	96	27.1
With soap	Often	70	19.8
	Sometimes	110	31.1
	Never	78	22
Water source	Protected Pipe	167	47.2
	Protected well	71	20.1
	Open sources	93	26.3
	Both protected and open source	23	6.5
Habit of washing	Always	175	49.4
cups after drinking	Often	64	18.1
	Sometimes	39	11
	Never	76	21.5

Table 3: Prevalence of *H.pylori* with respect to socio-demographic characteristics of study participants attending at university of Gondar Hospital Outpatient Department, 2016.

Variables		*H.Pylori* status		Total (%)	COR(95%CI)	P Value
		Non-infected(%)	Infected (%)			
Sex	Male	98(57)	74(43)	172(48.6)	1.57(1.02-2.43)	0.04
	Female	123(67.58)	59(32.42)	182(51.4)	1	
Age	≤25	78(59)	54(41)	132(37.3)	1.5(0.87,2.5)	0.15
	26-40	68(60.7)	44(39.3)	112(31.6)	1.4(0.8-2.4)	0.25
	≥41	75(68.2)	35(31.8)	110(31.1)	1	
Residence	Urban	121(62)	74(38)	195(55.1)	1	
	Rural	100(62.9)	59(37.1)	159(44.9)	0.97(0.63-1.5)	0.87
Marital Status	Married	124(61.7)	77(38.3)	201(56.8)	1.08(0.7-1.7)	0.74
	Unmarried	97(63.4)	56(36.6)	153(43.2)	1	
Educational Status	Unable to read and write	82(68.9)	37(31.1)	119(33.6)	0.7(0.4-1.24)	0.22
	Primary and secondary education	83(58)	60(42)	143(40.4)	1.1(0.66-1.92)	0.67
	Tertiary Education	56(60.9)	36(39.1)	92(26)	1	
Occupation	Student	64(61)	41(39)	105(29.7)	1	
	Farmer	35(59.3)	24(40.7)	59(16.7)	1.07(0.6-2.1)	0.84
	Housewife	59(64.1)	31(33.7)	92(26)	0.8(0.5,1.5)	0.5
	Government and Private employee	47(61.8)	29(38.2)	76(21.47)	0.96(0.5-1.8)	0.9
	Others*	16(66.7)	8(33.3)	24(6.8)	0.78(0.3-1.99)	0.6
Family monthly Income	<1000 ETB	116(64.4)	64(35.6)	180(50.8)	0.77(0.4-1.5)	0.44
	1000-2999 ETB	77(61.1)	49(38.9)	126(35.6)	0.9(0.45-1.75)	0.74
	>=3000 ETB	28(58.3)	20(41.7)	48(13.6)	1	
Family Size	1-4	84(58.7)	59(41.3)	143(40.4)	1	
	5-6	83(69.2)	37(30.8)	120(33.9)	0.64(0.4-1.06)	0.8
	>6	54(59.3)	37(40.7)	91(25.7)	0.98(0.6-1.7)	0.93

ETB: Ethiopia Birr

Table 4: Prevalence of *H.pylori* with respect to socio-demographic characteristics of study participants attending at university of Gondar Hospital Outpatient Department, 2016.

Variables		*H.pylori* Status		Total n(%)	COR (95%CI)	P-Value
		Non-infected (%)	Infected (%)			
Alcohol Drinking habit	Yes	108(62.8)	64(37.2)	172(48.6)	0.97(0.63-1.49)	0.89
	No	113(62.1)	69(37.9)	182(51.4)	1	
Type of alcohol	Non-drinkers	113(62.1)	69(37.9)	182(51.4)	1	
	Local alcohol	77(64.7)	42(35.3)	119(33.6)	0.89(0.55-1.45)	0.65
	Beverage alcohols	14(66.7)	7(33.3)	21(5.9)	0.82(0.32-2.13)	0.68
	Both	17(53.1)	15(46.9)	32(9)	1.45(0.68-3.1)	0.34
Frequency of drinking	Non-drinkers	113(62.1)	69(37.9)	182(51.4)	1	
	1-3 times per week	88(77.9)	45(33.8)	133(37.6)	0.84(0.53-1.34)	0.46
	>3 times per week	20(51.3)	19(48.7)	39(11)	1.56(0.78-3.12)	0.213
Hand washing Habit	Either before meal or after toilet	57(58.2)	41(41.8)	98(27.7)	1.3(0.8-2.06)	0.306
	Both before meal and after toilet	164(64)	92(36)	256(72.3)	1	
Source of water	Protected pipeline	103(61.7)	64(38.3)	167(47.2)	1	
	Protected well	45(63.4)	26(36.6)	71(20)	0.93(0.52-1.65)	0.804
	Open water sources	61(65.6)	32(34.4)	93(26.3)	0.84(0.5-1.43)	0.53
	Both protected and open source	12(52.2)	11(47.8)	23(9)	1.48(0.62-3.54)	0.384
Water treatment or purification	Treated physically or chemically	51(58.6)	36(41.4)	87(24.6)	1	
	Untreated	170(63.7)	97(36.3)	267(75.4)	0.81(0.49-1.33)	0.4

Table 5: Multivariable binary logistic regression analysis of *H.pylori* with the selected variables among dyspeptic patients who were attending in university of Gondar Hospital Outpatient Department, 2016

Variable		*H.Pylori* infection		Total (%)	COR(95%CI)	AOR(95%CI)	P Value
		Non-infected	infected				
Sex	Male	98(57)	74(43)	172(48.6)	1.57(1.02-2.43)	1.53(0.99-2.38)	0.055
	Female	123(67.58)	59(32.42)	182(51.4)	1	1	
Age	<=25	78(59)	54(41)	132(37.3)	1.5(0.87-2.5)	1.4(0.81-2.38)	0.277
	26-40	68(60.7)	44(39.3)	112(31.6)	1.4(0.8-2.4)	1.37(0.79-2.39)	0.261
	>=41	75(68.2)	35(31.8)	110(31.1)	1	1	

DISCUSSION

The overall magnitude of *H.Pylori* infection in this study was 37.6% (95%CI: 32.5-42.6%) which is comparable to reports from Canada (38%) (14) and Nepal (39%) (15). However, the magnitude was lower that those found in studies conducted in Gondar (85.6% and 65.7%), Bahir Dar (61%), Addis Ababa (81%), Hawassa (83.3%) and Sudan (83%) (13,16-20). The variation in the magnitude of *H.pylori* might be due to differences in diagnostic methods used, living standard and risk factors across geographic location. Although the magnitude of *H.Pylori* is high in the study area, it was expected to be more than the observed prevalence. The universality of Proton pump inhibitor, or other drugs used by the dyspeptic patients as a treatment might have influenced the results. It seemed that patients might have difficulty of recalling the past 2 weeks drug intake which might have influenced the stool antigen test results (15). In this study, the test kits used for diagnosis of *H.pylori* were coated with monoclonal antibody which is specific to a single epitope of the bacterial antigen. This could have reduced the positivity of the test contributing to the lower magnitude of *H.pylori* in this study (21).

There are conflicting reports on the relationship between age of patients and *H. pylori* infection. Studies conducted in Bhutan by Dorji et al in 2013 (22) and in China by Zhang et al in 2013 (23) documented a comparable prevalence of *H.Pylori* infection with no statistically significant differences among age groups, which is in agreement with the result of our study. However, other studies found out that the prevalence of *H. pylori* increases when age advances (13,16). The results of this study also showed that the magnitude of *H.Pylori* infection was higher in males (43%) than in females (32%) with no statistical association between *H. pylori* infection and sex. Likewise, a similar finding has been reported in China revealing that sex was not significantly associated with *H.pylori* infection (23). On the other hand, Zhu Y et al reported that the prevalence of *H. pylori* was higher in females than in males with no statistically significant differences (24). This is in contrary to a report from Canada, which found out that the magnitude was higher in males than in females. Presumably, the variation in the prevalence between males and females could be due to the difference in the lifestyles and habits such as smoking and alcohol consumption or antimicrobial use (25). In the present study, *H.pylori* infection has no statistical association with residence, family income, educational status, drinking and smoking habits. There was similarity in infection rate between dyspeptic patients from rural areas and urban dwellers, with no statistically significant association.

According to this study, marital status was not statistically associated with *H. pylori* infection, which is comparable with studies done in Gondar, Northwest Ethiopia (13), Ontario, Canada (25) and Yangzhong city, China (24). Contrary to our study, a study done in Lanyu Island, Taiwan (26), revealed that married individuals had shown significantly higher odds of *H.pylori* infection than unmarried ones. Evidences showed that marital status has shown to have an impact on

transmission of *H.pylori*. These evidences suggested that intrafamilial transmission plays an important role in spread of *H.pylori* particularly in developing countries (27,28). Authors described that individuals who were married to families with gastric ulcer and lived with infected partners increased the risk of *H.pylori* infection (29).The reason for this discrepancy might be the difference in the sample size used-the Taiwan study used a larger sample than our study.

The findings of some authors demonstrated a negative correlation between the rate of *H. pylori* infection and the level of education (17). Our result also showed a slightly higher rate of positivity among those who are educated. Moreover, our study revealed that alcohol consumption was not statistically associated with *H. Pylori* infection. This is in agreement with a study done in China showing that there was no association between the prevalence of *H. pylori* infection and the use of alcohol (24).

The limitation of this study is that it is a hospital-based study. Since the infection is mostly symptomless, patients who did not visit the hospital may not be represented. Only an immunological stool antigen test method was used for the detection of *H. pylori,* which probably underestimated the prevalence of *H.Pylori.*

In conclusion, the magnitude of the *H.Pylori* infection among patients with dyspepsia in this study was high implying that it is a public health problem. Hence, the Mnistry of Health and other stakeholders should give emphasis to prevention and control measures. Moreover, community-based screening is advisable to reduce the rate of transmission. Further community-based studies should also be conducted in the general population to understand the burden of the disease since the infection is usually asymptomatic.

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