Original article

Prevalence of *Helicobacter pylori* and risk factors among dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia: A comparative study

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Abstract

Background: *Helicobacter pylori* are curved gram-negative bacteria which causes gastritis and peptic ulcer disease (PUD). It is also an important risk factor for the development of gastric cancer and mucosal associated lymphoid tissue (MALT) lymphoma.

Objective: The main aim of this study was to assess the prevalence of *Helicobacter pylori* infection and related risk factors among symptomatic and asymptomatic adults.

Methods: A comparative cross-sectional study was conducted among dyspepsia and non-dyspepsia adults from March 2015 to October 2015 at Assosa General Hospital in Ethiopia. The presence of stool antigen of *H. pylori* was determined against anti-*Helicobacter pylori* antibody conjugated with colloid gold nitrocellulose membrane strip and a structured face-to-face interview was also administered to assess risk factors for *H. pylori* infection. Data were analyzed using SPSS version 20. Logistic regression was used to estimate odds ratios at 95% CI to the different risk factors.

Results: Of a total of 230(115 dyspeptic and 115 non-dyspeptic) study participants, overall 112(48.7%) antigens of *H. pylori* were detected. The prevalence of *H. pylori* was significantly associated with which gender in both dyspepsia [AOR=2.33, 95% CI: 1.13-5.86), p=0.023] and non-dyspepsia adults [AOR=1.07, 95% CI: 1.01- 3.83, p=0.035]. Further, the prevalence of *H. pylori* infection was significantly higher in dyspepsia patients 67/115 (58.3%) than non-dyspepsia 45/115 (39.1%) individuals [AOR=2.4, 95% CI: 1.2-13.7, p=0.002]. There was no significant association among age groups (p>0.05). Similarly, no significant association was observed in the prevalence of *H. pylori* with family size, educational status, marital status, toilet use habit, blood groups and occupation (p>0.05). A statistically significant association was observed between *H. pylori* infection and residence (p<0.05). Alcohol drinking, coffee consumption, cigarette smoking and *khat* chewing had no significant association with *H. pylori* infection (p>0.05).

Conclusion: The prevalence of *H. pylori* infection was high among symptomatic patients than non-symptomatic adults at Assosa General Hospital. *H. pylori* infection was significantly associated with which gender, residence area and hand washing habit after latrine. The burden of *H. pylori* that we reported necessitates the need to design and apply intervention measures that could decrease transmission and thus minimize the clinical consequences of infection. [*Ethiop. J. Health Dev.* 2017;31(1):4-12]

Key words: Dyspepsia, Non-dyspepsia, *Helicobacter pylori*, Prevalence, Stool Antigen Test

Background

Helicobacter pylori infection is one of the most common chronic bacterial infections of humans and has a worldwide distribution. Epidemiological studies strongly suggested that more than 50% of the world's populations are colonized by *H. pylori*. However, the prevalence of *H. pylori* infection varies from 10% to 90%, depending on age, geographic location and socioeconomic status of the populations. In developing countries, the prevalence of *H. pylori* infection was found in more than 70% of the populations. Conversely, it was found in only 27.6% to 32.5% in developed countries. Although some infected individuals harbor the organisms throughout their lives with no overt clinical symptoms, approximately 20% of infected individuals manifest one of many different outcomes, such as peptic ulcer disease, including gastric ulcer and duodenal ulcer, gastritis, non-ulcer dyspepsia, gastric cancer, and mucosa-associated lymphoid tissue lymphoma (1, 2).

H. pylori is a spiral, gram-negative, microaerophilic bacterium. Optimal growth occurs in the presence of 5–15% oxygen, which was established in 1982 by Robin Warren and Barry Marshall as the causative agent of gastritis and peptic ulcer, a discovery that revolutionized gastroenterology. Before Warren and Marshall, the human stomach was believed to be a sterile area. Today, *H. pylori* is recognized as the most common cause of gastritis and additionally, the organism is classified as a class one carcinogen because of its causal relationship to gastric adenocarcinoma, one of world's deadliest cancers (3, 4). Although the geographical and socio-demographic prevalence of human infection by *H. pylori* varies, prevalence does not parallel the incidence of morbidity

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caused by the infection. In Africa, for example, *H. pylori* infection is common and is the main cause of about 90% of duodenal ulcers and 70% of gastric ulcers on the continent (5).

The prevalence of *H. pylori* infection was defined according to the different demographic data of the patients, including gender, age, ABO blood group, educational status, household income, personnel habits and clinical diagnosis (1). In developing countries such as Ethiopia, particularly in Benishangul-Gumuz Region, there was no study conducted to assess the prevalence and its related risk factors for *H. pylori* infection where chronic gastritis and peptic ulcer diseases are most common. Therefore, it is important to study prevalence of *H. pylori* infection and the associated risk factors in this area.

Methods

Study context and area

A comparative cross-sectional study was conducted among dyspepsia and non-dyspepsia adults at Assosa General Hospital from March 2015 to October 2015. The hospital is found in Assosa town which is located in West Ethiopia of Benishangul-Gumuz Region. The hospital provides different inpatient and outpatient services in and around Assosa town, the capital city of the region and practical area for medical students.

Study population

The study populations were dyspeptic and non-dyspeptic adults who gave stool sample and interviewed during the study period at outpatient department Outpatient Department (OPD).

$$let\ P = \frac{P1 + rP2}{1 + r}$$

$$n1 = \frac{[Z\frac{a}{2}\sqrt{P(1-P)(1+\frac{1}{r})} + Zb\sqrt{\mathrm{P1}(1-\mathrm{P1})\frac{P2(1-P2)}{r}}]2}{(P1-P2)^2}$$

Sample size and sampling techniques

Since there are two populations (dyspepsia and non-dyspepsia) and the study aims to compare *H. pylori* between the two populations, the sample size was calculated using two population proportions as follows; n_1- is the size for dyspeptic patients andn_2- is number non- dyspeptic patients

Power of the test= 80% at a ratio of 1:1 for cases and controls; and at α =5%.

P1 =70 %, which is from a recent study on prevalence of *H. pylori* infection in dyspeptic patients and

P2 =49%, which is the prevalence of *H. pylori* infection in non-dyspeptic individuals from a recent study at Felege Hiwot Referral Hospital, Ethiopia (6).

n_1=105, and since n_1= n_2, then, n= n_1+n_2, n= 105 +105=210, the calculated initial sample size added 10% non-response rate, nf =210+20=230.

Therefore, a total of 230 study participants were enrolled using convenience sampling technique, who came to outpatient department of the hospital both symptomatic and asymptomatic individuals suspected of *H .pylori* infection.

Data collection and processing

A structured and pre-tested questionnaire was used to assess independent variables. Each participant was interviewed face-to-face about socio demographic characteristics, environmental conditions and personal habits. The presence of stool antigen of *H. pylori* was determined against anti-*Helicobacter pylori* antibody conjugated with colloid gold nitrocellulose membrane strip (Rapid stool antigen test). Stool specimens were collected using clean, dry, leak proof and wide-mouthed container. Specimens were tested using stool antigen test strip (Zhejiang Orient Gene Biotech CO., LTD, China) with 94.9%-100% sensitivity and 95-100% specificity, according to the manufacturer's instructions (7).

Laboratory methods

H. pylori antigen was detected against a test strip that utilized a monoclonal anti-*H. pylori* antibody conjugate based on a lateral flow chromatographic immunoassay technique. Stool sample was transferred to a vial with diluents, vigorously agitated and after two minutes of resting the tube, dropping around two to three drops (80μL) into the round window of the test cassette. Reading was made after 10 minutes of incubation at room temperature, and based on the appearance of colored lines across the central window of the cassette, two lines, C (control) and T(test), indicates positive test, only one line in C indicates negative result. A pale colored line in T was also considered as positive. Blood sample was also collected aseptically from finger of each participant, and blood grouping and Rh typing were performed.

Data analysis

Data were coded, entered and analyzed using SPSS version 20 (SPSS INC, Chicago, IL, USA). Binary logistic regression analysis was performed to check the presence of association between dependant and independant variables. Variables that showed significant association were selected for further analysis with multiple logistic regression models stepwise. P-value less than 0.05 were taken as statistically significant.

Inclusion criteria

For dyspepsia:

- Patients above 18 years of old
- Presence of at least two of the following symptoms; upper abdominal pain or discomfort, bloating, nausea, vomiting and early satiety for more than three months
- No previous abdominal surgery except for uncomplicated appendectomy, cholecystectomy, or hernia repair

For non-dyspepsia:

- Apparently healthy individuals for dyspepsia

Exclusion criteria

- Those individuals who were unable to communicate and give stool specimen due to different illness was excluded

Ethical clearances

The study was conducted after it was ethically reviewed and approved by the Institutional Review Board of Assosa University (ASU). Informed written consent was obtained from each participant before data collection. All the information obtained from the study subjects were coded to maintain confidentially. When the participants were found to be positive for *H .pylori*, they were informed by the hospital clinician and received proper treatment and counseling.

Results

Socio-demographic distribution of study participants

A total of 230 (115 dyspeptic and 115 non-dyspeptic) study participants were enrolled in this study of which 113(49.1%) were males and 117 (50.9%) females. Majority of the study participants 137 (59.6%) were in the age group 18-34 years. The mean age of the participants were 25.7+ 0.9 with range 18 to 88 years and 170 (73.9%) of them were from urban and 60(26.1%) were from rural area (Table 1). Prevalence of blood groups among participants was type O (42.2%) followed by A (26.5%), B (24.8%) and AB (6.5%). Further, analysis of Rh blood grouping showed that 222 (96.5%) of the total subjects were rhesus positive (Rh+ve) and 8 (3.5%) were rhesus negative (Rh-ve) (Table 2).

Prevalence of *Helicobacter pylori* among study participants

Of a total of 230 stool samples, an overall 112 (48.7%) *H. pylori* positivity rate was observed. The prevalence of *H. pylori* infection in dyspeptics and non-dyspeptics was 67/115 (58.3%) and 45/115 (39.1%) respectively (Figure 1). Females 69(61.6%) had a higher positivity rate of *H. pylori* than males 42 (38.4%) (Table1). The prevalence of *H. pylori* was significantly associated with gender in both dyspepsia [AOR= 2.33, 95% CI: 1.13- 5.86, p=0.023] and non-dyspepsia adults [AOR=1.07, 95% CI: 1.01-3.83, p =0.035]. Further, the prevalence of *H. pylori* infection was significantly higher in dyspepsia patients than non-dyspepsia individuals [AOR=2.4, 95% CI: 1.20-13.7, p=0.002]. Age specific prevalence for 18-34 years, 35-44 years and greater or equal to 45 years were 68/112(60.7%), 24/112 (21.4%) and 20/112 (17.9%) respectively. The highest positivity rate was observed in 18-24 year age group 68 (60.7%), although there was no significant association among age groups [p>0.05] (Table 4).

Associated factors for *Helicobacter pylori* infection

A significant relationship was observed between *H. pylori* infection and residence. Being reside in rural area has more chance of acquiring *H. pylori* than living in urban both in dyspepsia [AOR=10.5, 95% CI: 2.6- 42.9, p=0.001] and non-dyspepsia adults [AOR=4.2, 95% CI: 2.1-54.5, p=0.02] (Table 4). No significant relationship was observed between prevalence of *H. pylori* and family size, educational status, marital status, source of water and type of work (p> 0.05). In general, there was no significant association between occurrence of *H. pylori* and family income. But individuals whose monthly income was below 500 Ethiopian birr had a higher chance of acquiring *H. pylori* than those earning above 2001 Ethiopian birr among dyspepsia [AOR=9.88, 95% CI: 1.52- 64.3, p=0.026] and non-dyspepsia adults [AOR=5.1, 95% CI: 1.7-45.3, p=0.023] (Table 5).

Among personal habits: alcohol drinking, coffee drinking, cigarette smoking and *khat* chewing have no significant association with *H. pylori* infection [p>0.05] (Table 6). Among 230 study participants, 170(74.0%) used toilet for defecation of which 91 (53.5%) were found to be positive for *H. pylori* compared to 60(26%) who used open field for defecation, out of which 21 (35.0%) were positive for *H. pylori*. Observing the associations of personal life styles, toilet use had no significant association with prevalence of *H. pylori* in dyspepsia [AOR=1.88, 95% CI:0.79- 4.46, p=0.147] and in non-dyspepsia adults [AOR=2.41, 95% CI: 0.97- 5.9, p=0.058].A higher prevalence of *H. pylori* was obtained among patients who had not have the habit of hand washing after visiting the toilet 43(66.1%) than having hand washing after toilet 69 (41.8%). There was statistically significant difference in prevalence of *H. pylori* and hand washing habit after toilet among dyspepsia [AOR=1.4, 95% CI: 1.36- 4.61, p=0.034], as well as among non-dyspepsia individuals [AOR=1.2, 95% CI: 1.14- 2.79, p=0.023]. Analysis of ABO blood groupings and prevalence of *H. pylori* demonstrated that positivity rate of *H. pylori* was 37.5% in blood group O, 31.25% in blood group A, 25.0% in blood group B and 6.25% in blood group AB. In both ABO blood grouping and Rh typing, no statistically significant association was seen between *H. pylori* infection and blood group types of patients [p>0.05] (Table 7).

Table 1: **Prevalence of *H. pylori* against socio-demographic characteristics at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

	Dyspepsia (N=115)		Non-dyspepsia (N=115)		Total (N=230)	
	Yes N(%)	No N(%)	Yes N(%)	No N(%)	Yes N(%)	No N(%)
Sex						
Male	26(38.8)	28(58.4)	17(37.8)	42(60.0)	43(38.4)	70(59.3)
Female	41(61.2)	20(41.6)	28(62.2)	28(40.0)	69(61.6)	48(40.7)
Age group						
18-34	40(59.7)	29(60.4)	28(62.2)	36(51.5)	68(60.7)	65(55.1)
35-44	11(16.4)	11(22.9)	13(28.9)	12(17.1)	24(21.4)	23(19.5)
n>=45	16(23.9)	8(16.7)	4(8.90)	22(31.4)	20(17.9)	30(25.4)
Residence						
Urban	54(80.6)	33(68.8)	37(82.2)	46(65.7)	91(81.3)	79(67.0)
Rural	13(19.2)	15(31.2)	8(17.80)	24(34.3)	21(18.7)	39(33.0)

Table 2: **Blood group and *H. pylori* infection in adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Variables	Total tested (N) (%)	HP Positive (N=112)	HP Negative (N=118)
Blood group			
O	97(42.2)	42(37.5)	55(46.6)
A	61(26.5)	35(31.25)	26(22.0)
B	57(24.8)	28(25.0)	29(18.6)
AB	15(6.5)	7(6.25)	8(6.8)
Rh factor			
Positive	222(96.5)	107(95.5)	115(97.4)
Negative	8 (3.50)	5(4.50)	3(2.60)

HP =*Helicobacter pylori*

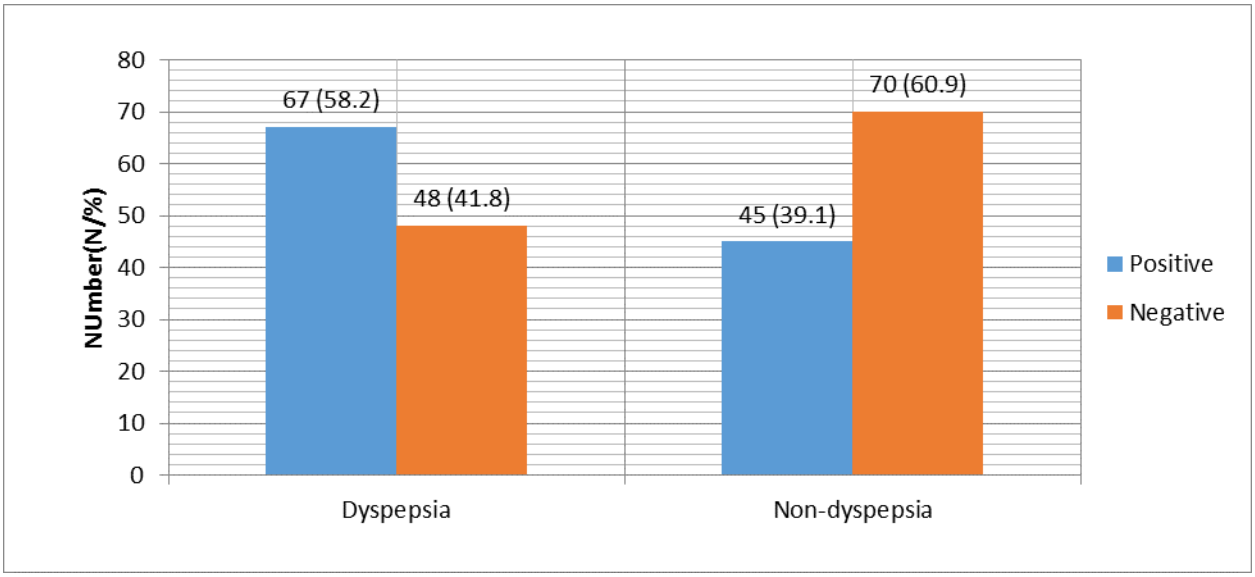

Figure 1: **Prevalence of *H. pylori* among dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Table 3: **Associations of H. *pylori* prevalence among dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Variables	*H. pylori* status		AOR(95% CI)	P-value
	Yes N(%)	No N(%)		
Dyspepsia	67(58.2)	48(41.8)	2.4(1.2, 13.7)	0.002*
Non-dyspepsia	45(39.1)	70(60.9)	1	-

AOR=Adjusted odious ratio, CI= Confidence interval, *p<0.05

Table 4: **Associations of socio-demographic factors with prevalence of H*. pylori*in dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Variable	Dyspepsia (N=115)		AOR(95% CI)	P-value	Non-dyspepsia (N=115)		AOR(95% CI)	P-value
	Pos N(%)	Neg N(%)			PosN(%)	NegN(%)		
Sex								
Male	26(38.8)	28(58.4)	1	-	17(37.8)	42(60.0)	1	-
Female	41(61.2)	20(41.6)	2.331(1.13, 5.86)	0.023*	28(62.2)	28(40.0)	1.07(1.01, 3.83)	0.035*
Age								
18-34	40(59.7)	29(60.4)	0.80(0.14, 4.5)	0.80	28(62.2)	36(51.5)	0.93(0.01, 3.4)	0.116
35-44	11(16.4)	11(22.9)	1.7(0.3, 10.5)	0.53	13(28.9)	12(17.1)	2.5(0.01, 6.13)	0.231
>=45	16(23.9)	8(16.7)	1	-	4(8.90)	22(31.4)	1	-
Residence								
Urban	54(80.6)	33(68.8)	1	-	37(82.2)	46(65.7)	1	-
Rural	13(19.2)	15(31.2)	10.54(2.6, 42.9)	0.001*	8(17.8)	24(34.3)	4.2(2.1, 54.5)	0.02*
Education								
Illiterate	15(22.4)	7(14.6)	0.32(0.06,1.68)	0.179	7(15.6)	12(17.1)	2.66(0.09, 79.3)	0.572
Read &write	5(7.40)	5(10.4)	2.20(0.32,14.9)	0.418	1(2.20)	10(14.3)	0.05(0.01, 2.88)	0.149
5- 8	13(19.4)	5(10.4)	0.42(0.08, 2.12)	0.296	9(20.0)	11(15.7)	2.43(.05, 118.9)	0.653
9-12	19(28.4)	18(37.5)	0.95(0.27, 3.24)	0.932	13(28.9)	17(24.3)	0.38(0.08, 19.1)	0.630
>12	15(22.4)	13(27.1)	1	-	15(33.3)	20(28.6)	1	-

AOR=Adjusted odious ratio, CI= Confidence interval, ∗p<0.05

Table 5: **Associations of socio- economic factors with prevalence of *H. pylori* in dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Variable	Dyspepsia (N=115)		AOR(95% CI)	P-value	Non-dyspepsia (N=115)		AOR(95% CI)	P-value
	PosN(%)	NegN(%)			PosN(%)	NegN(%)		
Marital status								
Non-married	25(37.3)	13(27.1)	0.45(0.11, 1.78)	0.260	17(37.8)	26(37.1)	1.52(0.19, 12.1)	0.693
Married	42(62.7)	35(72.9)	1	-	28(62.2)	44(62.9)	1	-
Occupation								
Government	21(31.3)	16(33.3)	1	-	13(28.9)	28(40.0)	1	-
Merchant	12(17.9)	8(16.7)	0.48(0.03, 7.9)	0.611	7(15.55)	7(10.0)	3.1(0.09, 95.3)	0.526
Farmer	16(23.9)	14(29.2)	1.4(0.08, 23.4)	0.815	8(17.8)	25(35.7)	0.05(0.001, 2.6)	0.139
Student	11(16.45)	6(12.5)	2.2(0.04,35.1)	0.567	7(15.55)	5(7.15)	4.1(0.08, 205.3)	0.475
House wife	7(10.45)	4(8.30)	4.4(0.3, 65.5)	0.284	10(22.2)	5(7.15)	0.35(0.01, 15.2)	0.590
Monthly income								
< 500EB	27(40.3)	17(35.4)	9.88(1.52, 64.3)	0.016*	16(35.6)	21(30.0)	5.1(1.7, 45.3)	0.023*
5001-1000EB	16(23.8)	11(22.9)	7.54(1.20, 43.4)	0.031*	7(15.50)	14(20.0)	7.6(2.1, 25.8)	0.026*
1001-1500EB	6(8.95)	8(16.7)	7.27(0.82, 64.4)	0.074	6(13.35)	8(11.4)	2.6(0.14, 47.1)	0.522
1501-2000EB	6(8.95)	6(12.5)	5.81(0.83,40.5)	0.075	6(13.35)	17(24.3)	14.6(0.8, 64.3)	0.824
>2001EB	12(17.9)	6(12.5)	1	-	10(22.2)	10(14.3)	1	-
Number of family								
<=5	37(55.2)	27(56.3)	1	-	31(69.0)	34(48.6)	1	-
> 5	30(44.8)	21(43.7)	1.4(0.39, 5.18)	0.594	14(31.0)	36(51.4)	4.13(0.32, 52.8)	0.275

AOR=Adjusted odious ratio, CI= Confidence interval, ∗p<0.05, ETB=Ethiopian Birr; 1 EB is approximately equal to 21.7 United States Dollar (USD on current currency exchange

Table 6: **Associations of personal habits with prevalence of *H. pylori* in dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

Variable	Dyspepsia (N=115)		COR(95% CI)	P-value	Non-dyspepsia (N=115)		COR(95% CI)	P-value
	PosN(%)	NegN(%)			PosN(%)	NegN(%)		
Alcohol drinking								
Yes	13(19.4)	9(9.70)	0.74(0.27,2.0)	0.567	6(13.3)	12(17.2)	1.41(0.48, 4.2)	0.528
No	54(80.6)	39(81.3)	1	-	39(86.7)	58(82.8)	1	-
Coffee drinking								
Yes	49(73.1)	34(70.8)	0.88(0.37, 2.1)	0.771	33(73.3)	47(67.1)	0.72(0.31, 1.6)	0.438
No	18(26.9)	14(29.2)	1	-	12(26.7)	23(32.9)	1	-
Cigarette smoking								
Yes	1(1.5)	4(8.30)	9.4(0.64, 97.5)	0.101	3(6.7)	4(5.7)	0.59(0.10, 4.5)	0.573
No	66(98.5)	44(91.7)	1	-	42(93.3)	66(94.3)	1	-
Khat chewing								
Yes	7(10.5)	7(14.6)	0.72(0.16, 3.1)	0.663	5(11.1)	10(14.3)	1.64(0.45, 6.0)	0.453
No	60(89.5)	41(85.4)	1	-	40(88.9)	60(85.7)	1	-
Source of water								
Pipe	56(83.6)	35(72.9)	1	-	41(91.1)	57(81.4)	1	-
Underground water	4(6.0)	3(6.30)	0.41(0.03, 6.1)	0.520	1(2.22)	6(8.6)	4.7(1.6, 53.4)	0.626
River	6(8.9)	8(16.7)	1.83(0.2, 17.1)	0.593	1(2.22)	4(5.7)	3.6(0.051, 25.3)	0.552
Pond	1(1.5)	2(4.1)	2.7(0.03, 29.5)	0.669	2(4.45)	3(4.3)	9.8(0.07, 134.2)	0.364

COR=Crude odious ratio

Table 7: **Associations of personal life styles and blood groups with prevalence of *H. pylori*among dyspepsia and non-dyspepsia adults at Assosa General Hospital, West Ethiopia, March 2015 to October 2015 (N=230)**

	Dyspepsia (N=115)		AOR(95% CI)	P-value	Non-dyspepsia (N=115)		AOR(95% CI)	P-value
	PosN(%)	NegN(%)			PosN(%)	NegN(%)		
Toilet use								
Toilet	54(77.1)	33(68.75)	1	-	37(82.2)	46(65.7)	1	-
Open FD	13(22.9)	15(31.25)	1.88(0.79, 4.46)	0.147	8(17.8)	24(34.3)	2.41(0.97, 5.9)	0.058
Hand washing habit after toilet								
Yes	42(62.7)	39(81.25)	1	-	27(60.0)	57(81.4)	1	-
No	25(37.3)	9(8.75)	1.4(1.16, 4.93)	0.034*	18(40.0)	13(18.6)	1.2(1.14, 3.79)	0.023*
Blood groups								
O	30(44.8)	31(64.6)	2.94(0.16, 54.9)	0.469	12(26.7)	24(34.3)	0.05(0.01,7.56)	0.170
A	19(28.3)	7(14.6)	0.6(0.03, 12.4)	0.746	16(35.6)	19(27.1)	0.03(0.01, 8.2)	0.202
B	13(19.4)	9(18.7)	1.67(0.08, 33.4)	0.735	15(33.3)	20(28.6)	0.06(0.01, 2.4)	0.137
AB	5(7.5)	1(2.1)	1	-	2(4.40)	7(10.0)	1	-
Rh factor								
Positive	63(94.1)	46(95.8)	9.4(0.16, 94.2)	0.621	44(97.8)	67(95.7)	16.1(0.5, 59.4)	0.344
Negative	4(5.9)	2(4.2)	1	-	1(2.20)	3(4.30)	1	-

AOR=Adjusted odious ratio, CI= Confidence interval, *p<0.05, Open FD=Open field defecation

Discussion

The overall prevalence of *H. pylori* infection among symptomatic and asymptomatic adults attending the outpatient department of Assosa General Hospital was 48.7%, which is in agreement with results reported from Ethiopia and elsewhere; 49- 70% in Bair Dar (6), Gondar (8); 47% in Karachi (9); 49.7% in Kuwait (3) and 46.6-64.8% in Iran (10). In contrast, this finding was lower than other results reported from Ethiopia; 83.3% in Hawassa (11); 81-89% in Addis Ababa (12, 13); 85.6% in Gondar (14) and elsewhere in the world, 66% in Kenya (15). Further, the present finding was found to be higher than the figures reported in Greenland 43% (16) and Canada 29.4% (17). The difference in prevalence of *H. pylori* infection may be attributed to differences in study area, subjects, sample size, personal hygienic condition and variations in the socio-economic status of the study subjects as well as difference in the sensitivity and specificity of testing methods.

The sex specific prevalence in female was 61.6% which was significantly high from that of males 38.4% and this is in agreement with previous studies shown by others in Kenya (15), Turkey (18) and Ethiopia (19), but it is inconsistent with studies in Ethiopia (6, 8,11), Turkey (20) and Pakistan (21). The lack of significant association between age of participants and *H. pylori* in the current study is in line with previous reports from elsewhere (7, 11), but in contrast to others (5, 8, 14, 18- 20). Presumably, the variation in prevalence between males and females could be due to the difference in the lifestyles, exposure to potential environmental sources and habits such as smoking and alcohol consumption. The prevalence of *H. pylori* infection in dyspeptics (58.3%) was significantly different from non-dyspeptics (39.1%) adults in this study which is consistent with a study in Thailand (1) and Kenya (15), but contrary to other studies in Ethiopia (6), China (22) and India (23).The possible reasons for these variations could be misdiagnosis of patients, differences in dyspepsia scoring systems, sample size, lack of clear-cut definition of dyspepsia, methodological weaknesses, including low study power, a lack of randomization and various confounding factors such as social, economic and demographic factors.

In the current finding, a significant association was observed between *H. pylori* infection and rural residence compared to urban which was in line with previous studies in Ethiopia (11) and Turkey (20). Even though a slight higher prevalence observed in rural residences, no statistically association occurred in previous studies in Ethiopia (19, 24) and India (23) in contrast to the present study. Higher prevalence of *H. pylori* infection in rural residents may be attributed to factors related to the lack of safe water supply and hygiene condition in the rural part of the country. The lower the family income was, the higher significantly associated with prevalence of *H. pylori* observed in the current study contrary to a study in China (22) and Benin (26).

There are contrasting reports on the association between alcohol consumption and prevalence of *H. pylori*. In this study there was no statistical association between alcohol consumption and *H. pylori* infection ($p>0.05$) which is similar to other studies in Thailand (1), South Africa (5), China (22) and Ethiopia (24). The absence of association in this study might be due to less number of alcohol users, the type and amount of alcohol consumed has effect on the association. But this study is inconsistent with other studies done in Ethiopia (14, 19). The reason for this contradictory result might be due to the difference in the type of alcoholic beverages consumed and the life time history of alcohol consumption. Coffee consumption is considered to be risk factors for *H. pylori* infection. However, no statistically significant association was observed in coffee drinking and prevalence of *H. pylori* which is in agreement to previous studies in Ethiopia (14), and elsewhere in the world in South Africa (5) Brazil (25).

This study also assessed the association of *khat* chewing and *H. pylori* infection. There was no statistically significant relationship among *H. pylori* infection and the predictor variable khat chewing in bivariate analysis which is similar to a study in Brazil (25). The absences of association in this study might be due to less number of chewers that cause difficulty to compute the association. Similarly, no statistically significant difference of *H. pylori* infection was noted in patients with cigarette smoking. Similar results have been reported in many previous studies in Thailand (1), China (22) and Ethiopia (24). This could possibly be attributed to *H. pylori* eradication by increased gastric acid secretion by smoking.

The prevalence *H. pylori* was not associated with marital status of participants ($p> 0.05$) which is in line with other studies in Ethiopia (14,24) and China (22), but different from other study in Northwest Ethiopia (19), in these case marital status was associated with prevalence of *H. pylori*. There was no statistically significant difference in the prevalence of *H. pylori* with respect to number of family in the household which is parallel to other studies in Ethiopia (19, 24), Brazil (25) and Benin (26), but this study is different from other studies elsewhere (15, 27). Likewise, no statistically significant association was observed in the prevalence of *H. pylori* infection and type of occupations in this study which is in line with other studies (14, 24, 25), but different from other studies (15, 19, 28). Among the socio-demographic characteristics of the participants, statistically significant difference was not obtained for educational attainment which is in agreement to studies (22, 25, 26) and inconsistent to other studies (15, 19, 28).

The source of drinking water had a strong effect on the prevalence of *H. pylori* infection (28). Water supply is an important source of *H. pylori* infection in families with high or low social economic levels (29). The fact of these conditions occurred during childhood is in accordance with previous studies that showed a greater probability of acquiring the infection during childhood; this could be a result of hygiene habits and a higher susceptibility to *H. pylori* infection during this period of life (30). No significant association was observed between source of drinking water and prevalence of *H. pylori* which is in line with previous study in China (22).This lower contribution of source of water to occurrence of *H. pylori* is due to most of the participants (74%) were urban dwellers and majority of them used pipe water.

In this study, open field defecation was not significantly associated with presence of *H. pylori* which is inconsistent to other studies in Benin (26) and Kazakhstan (28). Participants who did not wash their hands after toilet were significantly associated with occurrence of *H. pylori* infection which is supported by other report in Kazakhstan (28), but it is contradicted to previous reports that is prevalence of *H. pylori* was higher in those who washed their hands after toilet (19, 22). In the current study, though the most prevalent blood group was blood type O (42.2%), participants with blood group O did not show statistically significance susceptibility to *H. pylori* infection than other blood groups ($p>0.05$) which is compatible with other reports in Ethiopia (6, 11, 14), but different from a study done in Turkey (18). Still, the association of blood group types and *H. pylori* needs further study using better molecular techniques.

Conclusion and Recommendation:

The prevalence of *H. pylori* infection was high among symptomatic patients than non-symptomatic adults at Assosa General Hospital. The results of this study demonstrated that *H. pylori* infection was significantly associated with gender, residence area and hand washing habit after latrine. But it was not related to age, consumption of alcohol or tobacco or coffee, family size, educational attainment, marital status, family income, source of water, toilet use habit, occupation and blood typing. The burden of *H. pylori* that we reported necessitates the need to design and apply intervention measures that could reduce transmission, and thus lower the clinical consequences of infection. Further large scale community based studies are needed to better characterize the role of these potential sources of transmission of *H. pylori*.

Conflict of interest

The authors declare that they have no competing interests.

Authors' contributions

TD conceived and designed the study, collected data and performed data analysis. MA assisted the designing, analysis, interpretation of data and critical review of the manuscript. Both authors read and approved the final manuscript for publication.

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