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Helicobacter pylori infection and related factors among pregnant women at Debre Tabor General Hospital, Northwest Ethiopia, 2021: *Anemia highly related with H. pylori*

Hiwot Yisak[1], Debaka Belete[2] and Yeserk Mahtsentu[2]

Abstract

Introduction: Infection with *Helicobacter pylori* is one of the most frequent chronic bacterial illnesses in humans. Pregnant mothers are the populations most vulnerable to *H. pylori* infection. The objective of this study was to assess the prevalence of *H. pylori* infection and associated factors among pregnant mothers having antenatal care at Debre Tabor General Hospital, Debre Tabor, Ethiopia, 2021.

Methods and materials: Institutional based cross-sectional study design was conducted on 290 pregnant women. The stool antigen test is used to detect the active presence of the *H. pylori* antigen in the feces. Bivariate and multivariable logistic regression analyses were carried out to assess potential factors responsible for *H. pylori* infection. Variables associated with the prevalence of *H. pylori* infection with (p-value < 0.05) were considered statistically significant.

Results: The prevalence of *H. pylori* infection was 17.9%, with 95% (CI: 13.4%–22.3%). In all, 65.4% of *H. pylori infection* positive mothers had gastrointestinal problems and developed symptoms like abdominal cramp and diarrhea 1 (1.92%), loss of appetite 10 (19.23%), hiccups 9 (17.31%), abdominal pain which worsens when the stomach is empty 19 (36.54%), indigestion, and frequent heart burn 13 (25%) during the present pregnancy. Lesser frequency of handwashing practice AOR = 3.09, 95% CI (1.14–8.34), use of soap for handwashing AOR = 0.44, 95% CI (0.19–0.98), eating unwashed vegetables and fruits AOR = 2.279, 95% CI (1.03–5.04), and not being anemic AOR = 0.268, 95% CI (0.10– 0.71), were significantly associated with *H. pylori* infection.

Conclusions: This study shows that the prevalence of *H. pylori* infection among pregnant women was low compared with that of the general population. Although in the lower prevalence, the level of anemia was strongly associated with the prevalence of *H. pylori* infection. This implies that *H. pylori* infection is a public health problem.

Keywords

anemia, Debre Tabor, *Helicobacter pylori* infection, hand-washing, pregnant women

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Introduction

Helicobacter pylori is a Gram-negative, spiral-shaped, microaerophilic bacteria that causes inflammation of the stomach lining and inside of the stomach.[1,2] It is the most common bacterial illness infecting about half of the individuals in developed countries and 80% of people in underdeveloped ones.[3–8]

[1]Department of Public Health, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia
[2]Department of Medical Laboratory, College of Health Sciences, Debre Tabor University, Debre Tabor, Ethiopia

Corresponding author:
Hiwot Yisak, Department of Public Health, College of Health Sciences, Debre Tabor University, Debre Tabor 272, Ethiopia.
Email: hyisak@yahoo.com

H. pylori infection is known to cause duodenal and gastric ulcers, as well as being a major risk factor for stomach cancer.[2,3,9–17] Peptic ulcer, adenocarcinoma, and stomach lymphoma are all linked to this illness.[18–20] *H. pylori* is classified as a Class 1 carcinogen by the World Health Organization.[17,21–23]

Because of decreased gastric acid production during early pregnancy, which results in increased accumulation of a woman's body fluid, steroid hormone changes, and immunologic tolerance could lead to the activation of latent *H. pylori* infection, which can exacerbate nausea and vomiting; pregnancy increases susceptibility to *H. pylori* infection.[24,25] Pregnant mothers are the most sensitive to the infection; epigastric pain/dyspepsia, flatulence, fullness, nausea, vomiting, anemia, fetal development restriction, fetal abnormalities, and low birth weight are all clinical signs of *H.pylori infection*.[2,3,14,26] Early pregnancy nausea and vomiting are frequent, affecting 50%–90% of pregnant women in the first half of their pregnancy, and can have a significant impact on maternal health and quality of life.[27,28]

Morning sickness, often known as nausea and vomiting during pregnancy, affects 70%–80% of all pregnancies in the first trimester. It usually begins between 4 and 8 weeks of pregnancy; however, symptoms can last until the 16th–18th week. It is usually a minor problem that goes away on its own.[29] Infection with *H. pylori* during pregnancy is linked to iron deficiency anemia, fetal abnormalities, miscarriage, pre-eclampsia, and fetal growth limitation, in addition to gastrointestinal issues such as hyperemesis gravidarum (HG).[7,30] HG is a consequence of chronic *H. pylori* infection in pregnant women that affects 0.3%–2.0% of all pregnancies.[2,5,10,18,28] For 10–14 days, a triple-drug regimen combining two antibiotics and a proton pump inhibitor (PPI) is usually required to treat this infection.[9] There are currently no standards for treating *H. pylori* infection during pregnancy, and the best treatment remains unknown.[25]

The global prevalence of *H. pylori* infection in pregnant women was assessed to be 46%; the lowest and highest frequency of the infection was in Finland in 2000 (7.6%) and Sudan in 2012 (94%), respectively, with Europeans accounting for 25% and South America accounting for 62%.[3] *H. pylori* is acquired in early childhood through family members via oral–oral, gastric–oral, or oral–fecal pathways, according to current research, and can last until maturity.[9,20,30] In low-income areas, fecal–oral transmission is more common.[31] Various studies from various geographical regions revealed that the prevalence of *H. pylori* during pregnancy ranged from 7.6% to 94% in European countries, 24% to 61% in Asian countries, 50% to 70% in American countries, and more than 52% in Africa.[3]

In Ethiopia, the prevalence of *H. pylori* infection ranged from 7.7% to 91%, indicating that it is a common cause of gastrointestinal disorders.[10] For example, a study on assessment of the association between *H. pylori* infection and occurrence of anemia among pregnant women attending antenatal care (ANC) in kulito health Center, Halaba Zone, South Ethiopia, 2018, found that the overall prevalence of *H.pylori* infection among study participants was found to be 54.7% (95% CI: 47.9–61.4). Hence the objective of this study was to assess the prevalence of *H. pylori* infection and associated factors among pregnant women who have ANC visits at Debre Tabor General Hospital, Northwest Ethiopia from 1 December 2020 to 30 February 2021.

Methods and materials

Study design

The institution-based cross-sectional study design was used to assess the prevalence of *H. pylori* infection and associated factors among pregnant women

Study area and period

The study was conducted at Debre Tabor general hospital which is the zonal referral hospital found in Debre Tabor town. Debre Tabor town is found in the South Gondar administrative zone, Amhara region, Northwest Ethiopia at about 668 and 103 km away from the capital Addis Ababa and Amhara region/Bahir Dar, respectively. Debre Tabor town is the capital of the South Gondar Zone which is located in the Amhara Region about 100 km Southeast of Gondar and 50 km east of Lake Tan. The town has a total population of 83,082 of whom 39,781 are males and 43,301 are females. According to the current Ethiopian Health Tier system, it serves 1 million to1.5 million people.

Source of the population: All pregnant women at Debre Tabor town and surrounded rural kebeles.

Study population: All pregnant mothers had ANC visits during the study period at Debre Tabor General Hospital.

Variables of the study

Dependent variable:

Prevalence *of H. pylori* infection.

Independent variables:

Socio-demographic factors

Source of drinking water

Handwashing practice

History of vomiting

Anemic status

Habit of eating spicy food

Numbers of gravidity

Gestational age

History of gastrointestinal discomfort/illness.

Eligibility criteria

Inclusion criteria. All pregnant women who have ANC visits at an ANC in Debre Tabor General Hospital, Northwest Ethiopia from 1 December 2020 to 30 February 2021.

Exclusion criteria. Pregnant mothers who have a critical illness, not able to give stool samples, and mothers who took anti *H.pylori* drug before 2 weeks.

Sample size and sampling technique

Sample size determination. The sample size was determined by using a single population proportion formula. Thus, the sample size was calculated with the assumptions of 95% confidence level, 5% margin of error, and by using the previous prevalence study done among women of childbearing age in Addis Ababa, Ethiopia, was 21.9%.[5]

Thus, by applying the formula a sample size of 264 pregnant mothers and the 10% of unresponsive rate (264 × 10)/100 is 26. Then by adding 26 from the total sample size the minimum final sample size for study subjects was 26 + 264 = 290 = 290.

Sampling procedure. After obtaining informed written consent from each participant, a systematic random sampling technique was employed. In the hospital, on average 20 pregnant mothers per day visited for ANC. Therefore, in 22 working days of the month, there were 440 pregnant mothers and for the 3 months, there were 1320 pregnant mothers who requested *H. pylori* stool antigen test (HPSA). Therefore, to address the study subjects, the sample size was collected proportionally every day according to the number of pregnant mothers visited for ANC during the study period. Thus k = N/n => 1320/290 = 4.45, and then the data were collected from every fourth pregnant mother who visited ANC during data collection priories.

Operational definition

Pregnant mothers: are defined as the development of one or more fetuses in the uterus of a woman.

Trimester: One of the 3-month periods into which pregnancy is divided.

***H. pylori* stool Antigen test (HPSA):** is a lateral flow chromatographic immunoassay for the qualitative detection of *H.pylori* antigen in the human fecal specimen.

Data collection

The questionnaire was developed after a thorough review of the kinds of literature. Before data collection, adequate training was given to data collectors and supervisors. The training aimed to collect the data correctly and to give a brief explanation to participants. A pretest was conducted at Debre Tabor health center before the study. The questionnaire contained questions related to socio-demographic characteristics, behavioral habits, and environmental conditions. There are several laboratory methods available to detect *H. pylori* infection. Some of these are HPSAT and blood serum tests. The current study used HPSAT.

Stool sample collection

A clean plastic screwed cupped container and wooden applicator sticks were distributed and the participants were instructed to bring stool specimens to the laboratory. Enough amounts of fresh fecal samples were collected from each study subject and analysis was done as early as arrival or stored at 2°C–30°C until analysis. At the time of sample collection, the date of sampling, the name of the participant, age, and consistency of the stool (formed, semi-formed and watery) was recorded for each study subject on a recording format and the container.

Determination of H. pylori stool antigen

Stool antigen tests are the first choices for *H. pylori* infection diagnosis in pregnancy since they are easy to perform and are low-cost noninvasive diagnostic tests. The stool antigen test is an enzymatic immunoassay that detects the active presence of *H. pylori* antigen in human feces. A stool antigen test is preferred to determine the presence of *H. pylori* infection and status after eradication. After fecal sample collection, the HPSA strip was removed from the pouch and placed on a clean, flat surface; the test device was checked for expiration date printed on the sealed pouch; it was brought to room temperature before opening; enough amount of stool sample is added to the bottle to make dilute with buffer and the plastic sampling bottle is shaken thoroughly.

The sample bottle is to be held in a vertical direction in the correct position; then break off the plastic cover carefully; be sure that there are no air bubbles; then add 3–4 drops from the sample solution into the dropping hole; and read out the test result after 5–10 min. We do not consider the result after 15 min. When an adequate volume of an extracted fecal specimen is dispensed into the sample well of the test cassette, the specimen migrates by capillary action across the cassette. If *H. pylori* antigens are present in the specimen, binding to the anti- *H. pylori* conjugates. The immunocomplex is then captured on the membrane by the precoated antibody, forming a burgundy-color at T band, control indicating *H. pylori*-positive test result. The

absence of the T band suggests that the concentration of *H.pylori* antigens in the specimen is below the detectable level, indicating an *H.pylori* negative test result.

Data quality control

Before starting the actual work, the quality of the *H. pylori* antigen testing kit was checked by a quality control test (using known positive). The data were collected using a pretested structured questionnaire at Debre Tabor health center and all laboratory procedures were supervised and checked by taking 5% of the collected data randomly for its correctness and completeness by the principal investigator daily. To eliminate observer bias, each stool sample was examined by two laboratory technicians. The technicians were informed about the health status of the study participants. In cases where the results were discordant, a third senior reader is confirmed. The result of the third expert reader was considered as the final result.

Data processing and analysis

The obtained data were checked, edited manually, then coded and entered into Computer using Epi info 7 and exported to the Statistical Package for the Social Sciences (SPSS) version 20. The prevalence of *H. pylori* infection was presented by frequency distribution tables, percentages, graphs, and figures after descriptive statistics were generated. Bivariate and multivariate logistic regression analyses were carried out to associate potential factors with *H. pylori* infection. Factors that had bivariate associations with (p-value < 0.2) were entered into multivariate logistic regression for further analysis. Variables associated with *H. pylori* infection with (p-value ≤ 0.05) were considered as significant factors.

Ethical considerations

The study was conducted after getting an ethical approval letter from the Institutional Review Board (IRB) of Debre Tabor University (DTU) with a Reference number of DTUCHS/16/49/2020. Informed written consent was obtained from individuals included in the study participants. Participants were also informed that all personal information was treated strictly confidential. The study participants were found positive for *H. pylori* infection treated with first line drugs ordered by a physician from the Debre Tabor general hospital.

Result

General characteristics of the study participants

A total of 290 study subjects participated. The mean age was 26.59 with *SD* at +4.23 years; the age range was 22 years, and the minimum and maximum ages were 18 and 40, respectively. The religion of the participants was Orthodox Christian 227 (78.3%), followed by Muslim 32 (11%). About 45.5% had attained primary school and 92.4% were married. Almost 78.3% of the women were orthodox Christian, which is the largest Amhara ethnic group. Among the participants, 104 (35.9%), 68 (23.4%), 32 (11%), 68 (23.4%), and 18 (6.2%) were housewife farmers, governmental employees, merchants, and daily laborers, respectively. Regarding the residence, 64 (22.1%) were in urban and 227 (77.9%) were rural dwellers (Table 1).

Prevalence of H. pylori *infection*

The prevalence of *H. pylori* infection was 17.9% with 95% (CI: 13.4%–22.3%). Of the total 52 mothers positive with *H. pylori* infection, 57.7% had Ptyalism, nausea, and vomiting during the current pregnancy. This is considered one of the reasons for the *H. pylori* infection. About 15.4% had a history of severe nausea and vomiting in the previous pregnancy.

A total of 65.4% of *H. pylori* infection-positive mothers had gastrointestinal problems and developed symptoms like abdominal cramp and diarrhea 01 (1.92%), loss of appetite10 (19.23%), hiccups 9(17.31%), abdominal pain, that is, worsen when the stomach is empty 19 (36.54%), indigestion and frequent heartburn 13 (25%) during the present pregnancy. Considering the gestational age of the *H. pylori* infection-positive pregnant mothers the least prevalent 9 (17.31%) was the first trimester and the highest prevalence 26 (50%) was the third trimester of gestational age.

Regarding the levels of anemia for the *H. pylori* infection-positive pregnant mothers 4 (7.7%) had 7–9g/dL, 12 (23.1%) 9–11g/dL, 25 (48.1%) $<$ 7g/dL, and 11 (21.2%) $>=$ 12 g/dL. Furthermore, of the 52 *H. pylori* infection-positive pregnant mothers 23 (44.2%), 7 (13.5%), 1 (1.9), and 21 (40.4%) had A, B, AB, and O blood group, respectively.

Moreover, *H. pylori* infection-positive pregnant mothers with the highest prevalence of 18 (34.62%) were gravida two, and the least prevalence 8 (15.4%) were gravida one (Figures 1 and 2).

Factors associated with H. pylori *infection*

Bivariate analysis was used to explore the association between *H. pylori* infection with each of the determinant factors. Residence, gravidity, source of drinking water, handwashing practice, materials used to washing hands, feeding unwashed vegetables and fruit, feeding spices foods, availability of latrine at home and its usage habit, and levels of anemia have met the criteria ($p < 0.2$) to be further analyzed in multivariate logistic regression analysis.

Table 1. Sociodemographic characteristic of the prevalence of *H. pylori* infection.

Variables		Frequency ($n = 290$)	Percent (%)
Age in years	<=19	6	2.1
	19–24	74	25.5
	25–29	148	51.0
	30–34	43	14.8
	35–39	15	5.2
	40+	4	1.4
Marital status	Married	268	92.4
	Single	19	6.6
	Divorced	3	1.0
Educational status	Unable to write and read	16	5.5
	Able to write and read	22	7.6
	Primary school	132	45.5
	Secondary school and above	120	41.4
Occupation	Farmer	68	23.4
	Merchant	32	11.0
	Governmental employee	68	23.4
	Daily laborer	18	6.2
	Housewife	104	35.9
Religion	Orthodox Christian	227	78.3
	Muslim	32	11.0
	Catholic	18	6.2
	Protestant	13	4.5
Family size	<=3	192	66.2
	4	48	16.6
	>=5	50	17.2
Handwashing practice	Regularly	143	49.35
	Sometimes	56	19.3
	Immediately after contact with dirt	91	31.3
Nausea and vomiting among H.pylori positives	Ptyalism	30	57.5
	Severe nausea and vomiting	8	15.4
	No nausea and vomiting	14	27.1
Levels of anemia	7–9 g/dL	23	7.9
	9–11 g/dL	77	26.5
	>=12 g/dL	28	9.7
	<7 g/dL	162	55.8

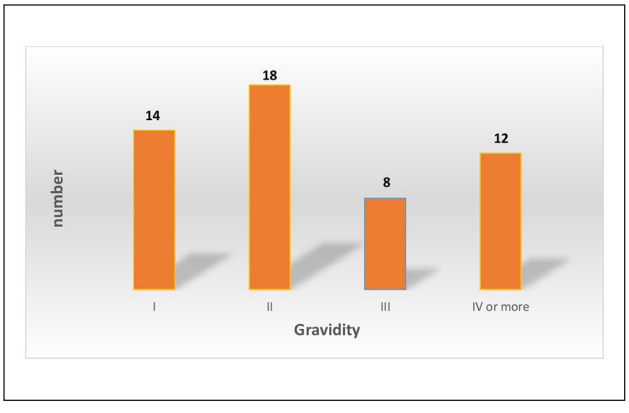

Figure 1. Distribution of *Helicobacter Pylori* infection among gravidity.

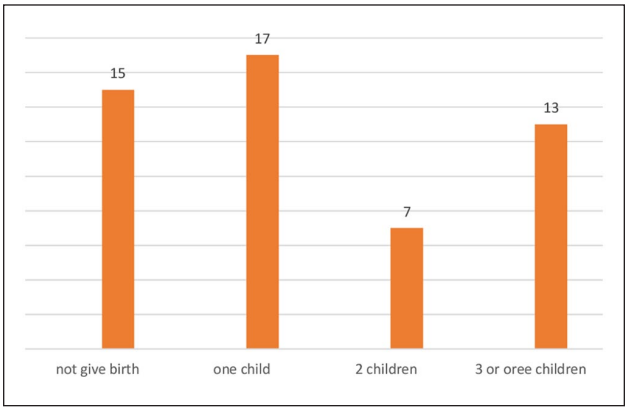

Figure 2. Distribution of *Helicobacter Pylori* infection with parity.

Table 2. Bivariate and multivariate analysis for factors associated with *H. pylori* infection.

Variable		*H. pylori* infection		Crude OR (95% CI)	Adjusted OR (95%CI)
		Yes (%)	No (%)		
Residence	Rural	43 (15.52)	193 (66.55%)	**0.405 (0.211, 0.777)****	0.415 (0.120,1.437)
	Urban	9 (6.55)	33 (11.38)	1	1
Gravidity	I	14 (4.83)	81 (27.93)	**2.104 (0.881, 5.026)***	0.805 (0.266, 2.438)
	II	18 (6.21)	78 (26.9)	1.576 (0.683, 3.636)	0.767 (0.258, 2.281)
	III	8 (2.76)	46 (15.9)	2.091 (0.769, 5.684)	0.999 (0.301, 3.311)
	IV or more	12 (4.13)	33 (11.38)	1	1
Source of drinking water	Tap water	24 (8.27)	191 (65.9)	**2.151 (1.118, 4.139)***	0.902 (0.324, 2.510)
	Well water	28 (9.65)	47 (16.21)	1	1
Hand washing practice	Regularly	19 (6.55)	124 (42.8)	**2.338 (1.195, 4.574)****	1.865 (0.885, 3.932)
	Sometimes	9 (3.10)	47 (16.21)	1.871 (0.798, 4.386)	**3.090 (1.144, 8.348)***
	Immediately after contact with dirt	24 (8.28)	67 (23.1)	1	1
Materials used to wash hands	Water and soap	30 (10.35)	81 (27.93)	**0.378 (0.205, 0.698)****	**0.439 (0.196, 0.983)***
	Water only	22 (7.9)	157 (54.14)	1	1
Feeding unwashed vegetables and fruits	Yes	31 (10.7)	80 (27.6)	**2.915 (1.575, 5.397)****	**2.279 (1.031, 5.037)***
	No	21 (7.24)	158 (54.5)	1	1
Feeding spiced foods	Yes	21 (7.24)	145 (50)	**2.302 (1.248, 4.245)****	1.746 (0.778, 3.916)
	No	31 (10.7)	93 (32.1)	1	1
Availability of latrine and its usage habit	Yes	17 (5.86)	193 (66.55)	**0.480 (0.247, 0.933)***	1.118 (0.400, 3.124)
	No	35 (12.06)	45 (15.51)	1	1
Levels of anemia	7–9 g/dL	4 (1.4)	19 (6.55)	0.867 (0.272, 2.763)	1.029 (0.293, 3.613)
	9–11 g/dL	12 (4.14)	65 (22.41)	0.988 (0.467, 2.090)	1.333 (0.586, 3.032)
	>= 12 g/dL	11 (3.8)	17 (5.9)	**0.282 (0.118, 0.673)****	**0.268 (0.101,0 .711)****
	<7 g/dL	25 (8.62)	137 (47.24)	1	1

NB: ** is *p*-value =< 0.02,* is *p* value < 0.05.

The factors associated with multivariate logistics regression analysis ($p < 0.05$) with the *H. pylori* infection were found to be handwashing practice, materials used for hands washing, feeding of unwashed vegetables and fruits, and levels of anemia.

However, there was no significant association observed with the variables, residence, gravity, source of drinking water, feeding of spices foods, and availability of latrine and its usage habit between the prevalence of *H. pylori* infection ($p > 0.05$) (Table 2).

Discussion

In this study, 290 pregnant women were recruited and examined for the presence of *H. pylori* infection. The result revealed that 52 (17.9%) pregnant women had *H. pylori* infection. The finding of this study is in line with the study conducted in France[32] and a systematic review and meta-analysis study done on global prevalence.[3] The prevalence of this study is higher than the prevalence of previous studies conducted in the Hispanic population.[33]

Compared with other previous studies, the prevalence of the current study is much lower than the study conducted in different parts of Ethiopia[5,10,19,34–37] a meta-analysis study in Iran,[38] in Rural Durango, Mexico,[39] Ilam, Iran,[3] in Uganda,[6] in Kawempe Health Center Kampala, the capital city of Uganda,[14] Alexandria University, Egypt[2] in Sudan,[40] South of Libya,[33] University of Maiduguri Teaching Hospital Borno State Nigeria[22] in Sant'Anna Hospital of Turin, Italy,[41] in the Netherlands,[27] Ardabil, Chile,[18] Urmia University, Iran,[28] Bio Bio Province. VIII Region. Chile,[42] Alagouza Police Authority Hospital Cairo, Egypt,[41] in Abakaliki, South Eastern Nigeria,[26] Aerospace Center Hospital in Beijing, China,[30] Keffi, Nasarawa State, Nigeria[11] in Tehran-Iran,[43] in Turkey.[44] This difference may be due to the method used and sensitivity/specificity of the laboratory to detect *H. pylori* infection, time of study periods, geographical variation of factors across different areas, poor personal and environmental hygiene, behavioral factors, and socioeconomic status of individuals.

The level of anemia was found to be a significant factor strongly associated with the prevalence of *H. pylori* infection. pregnant women who had levels of anemia ≥12 g/dL with AOR (95% CI: 0.268 [0.101–0 .711) was 27% times less likely to have *H. pylori* infection compared with those who had a level of anemia <7 g/dL; this is consistent with the study conducted in the Kulito Health Center, Halaba Zone, South Ethiopia,[35] Ethiopia,[45] Arba Minch Town, Gamo Gofa Zone, Ethiopia,[36] in Tehran-Iran,[43] Ilam, Iran

Boditii Health Center, Southern.[46] The probable reason for this study could be due to some possible mechanisms by which *H. pylori* impacts iron metabolism by decreased absorption. *H. pylori* infection developed chronic gastric ulceration; this decreased hydrochloric acid (ascorbic acid secretion) concentration which increased hepcidin production associated with *H. pylori* gastric ulceration leading to reduced intestinal iron absorption. *H.pylori* can be expected not to survive in acidic gastric conditions produced by acidic citrus fruits. When the uptake of iron by *H. pylori* for growth does not occur, increased availability of iron in lactoferrin in the gastric mucosa and the absorption of iron is not affected. On the contrary, bacterium host competition does not occur for dietary iron supply.[14,35,44]

Handwashing practice was found to be another significant factor associated with the prevalence of *H. pylori* infection and participants who had practiced handwashing sometimes with AOR (95% CI: 3.090 [1.144–8.348) were 3.1 times more likely to have the *H. pylori* infection compared with those who had practiced handwashing immediately after contact with dirt, which is consistent with other studies done in Ethiopia,[10,47] University of Maiduguri Teaching Hospital Borno State Nigeria,[22] and Alaska Area Indian;[17] this suggests that the mode of transmission of *H. pylori* could be the result from the fecal–oral route that can relate to poor hygienic practices (handwashing). Ingestion is not the only means of transmission potentially affected by water. Sometimes handwashing practice was associated with the prevalence of *H. pylori* infection.[17]

Materials used to wash hands were found to be another factor associated with the prevalence of *H. pylori* infection. Participants who used water and soap to wash hands with AOR (95% CI: 0.439 [0.196, 0.983) were 44% times less likely to have *H. pylori* infection compared with those who had used water only; this is consistent with the result of the current study. The reason for this may be that soap removed the bacterium because it decreases the water surface tension. However, some soaps had an antibacterial effect so they killed the bacterium.

Eating unwashed and raw vegetables and fruits was found to be another factor associated with the prevalence of *H. pylori* infection and study participants who had been fed unwashed vegetables and fruits with AOR (95% CI: 2.279[1.031–5.037) were 2.3 times more likely to have *H. pylori* infection compared with those who had eaten unwashed vegetables and fruits, which is consistent with a study conducted in Jigjiga University, Jigjiga, Somali Regional State of Ethiopia[20] University of Gondar Hospital, Gondar, Ethiopia.[19] The probable reason could be that the bacterium may contaminate the vegetable and fruit directly from the environment or the vegetable and fruit plant came from a contaminated soil/environment.

In bivariate logistic regression, source of drinking water showed that pregnant mothers who drank well water had slightly higher *H. pylori* infection than those who used tap water ($p < 0.2$). Among 52 *H. pylori*, pregnant mothers, 67.31% had access to a latrine and its usage habit compared with 32.7% prevalence in those who had no access to a latrine and its usage habit ($p < 0.2$), which is similar to the study done in Northwest Ethiopia.[19,20,34] The reason for this might be due to the greater likelihood of fecal contamination of well water when compared with tap water, which is regularly treated before distribution.

There was a significant association between the prevalence of *H. pylori* pregnant infection and residence with OR (95% CI: 0.405[0.211–0.777). The probable reason could be connected with the exposure to environmental pollution and other risk factors that facilitate acquisition of the infection.

Strength

Use of HPSAT diagnostic methods to detect *H.pylori* for which stool antigen tests is one of the first choices.

Limitation

The limitation of this study is that only the *H. pylori* stool antigen test was used. Using multiple diagnostic methods increases the detection of *H. pylori* infection. However, the stool antigen test has been used widely in Africa. The study design was institution-based cross-sectional, unlike community-based studies which may not represent the status of *H.pylori* among pregnant mothers in the entire community.

Conclusion

This study shows that the prevalence of *H. pylori* infection among our sample population is low unlike the prevalence of *H.pylori* in the general population in Ethiopia. The levels of anemia which was strongly associated with the prevalence of *H. pylori* infection, handwashing, eating of unwashed vegetables and fruit, and materials used to wash hands significantly associated with the prevalence of *H. pylori* infection. This implies that *H. pylori* infection is a public health problem.

Recommendation

Although the prevalence of *H. pylori* infection was low, a constant check of the *H. pylori* infection in pregnancy, regular handwashing using water and soap, and improvement of education levels in women of gestational age are actions to be taken.

Health professionals should promote the importance of personal hygiene, including regular handwashing after visiting the toilet to combat fecal–oral transmission.

The health office could plan and strengthen awareness creation programs on the transmission routes and

prevention mechanisms of *H. pylori* infection to reduce the burden. Other researchers could conduct community-based studies in the general population to understand the burden of the infection.

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Author contribution(s)

Hiwot Yisak: Conceptualization; Formal analysis; Investigation; Methodology; Supervision; Validation; Writing—original draft.
Debaka Belete: Formal analysis; Investigation; Software; Writing—review & editing.
Yeserk Mahtsentu: Conceptualization; Data curation; Investigation; Methodology.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on a reasonable request.

Consent to publish

All the authors agreed and gave consent for the publication.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical considerations

The study was conducted after getting an ethical approval letter from the Institutional Review Board (IRB) of Debre Tabor University (DTU) with the Reference number DTUCHS/16/49/2020. Informed written consent was obtained from individuals included in the study participants. Participants were also informed that all personal information was treated as strictly confidential. The study participants found positive for *H. pylori* infection treated with first line drugs ordered by a physician from the Debre Tabor general hospital.

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ORCID iD

Hiwot Yisak https://orcid.org/0000-0003-2922-289X

Supplemental material

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