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The Prevalence of Helicobacter pylori Infection and Its Associated Risk Factors Among Patients Undergoing Upper Gastrointestinal Diagnosis in Shashemene Referral Hospital in Shashemene, Ethiopia

Mulu Bekele Zufan Besewi Beyene Dobo
Hawassa University, Department of Biology, P. O. Box: 05, Hawassa, Ethiopia

Abstract
Background:- *Helicobacter pylori* infection is the principal cause of chronic active gastritis in developing countries including Ethiopia. **Objective:-** The main objective of the present study is to evaluate the prevalence of *H. pylori* infection colonization and its associated risk factors among upper gastrointestinal patients aged ≥14 years. **Method:-** Hospital-based retrospective and cross-sectional study was conducted at Shashemene referral Hospital among upper gastrointestinal positive patients who underwent diagnosis in the Hospital from September 2012-August 2017. **Results:-** After organizing the recorded data of the 1966 upper gastrointestinal patients, the overall prevalence of five consecutive years (September 2012-August 2017) *H. pylori* infection in this study was found to be 30.3% (n= 592/1966). The majority of the patients were in the age range of 20-29 (218/657(33.03%)) and ≥60 (46/149(30.9%)). The overall prevalence of *H. pylori* in this study dropped from 45.5% in September 2012 - August 2013 to 15.2% in September 2016 - August 2017. The most important risk factors in this study were large family size, age, poor personal hygiene, poor hygiene in nutrition and life style, poor economic status, stress, alcohol, overcrowding and educational level. Marital status of the patients (2.793 OR; 95%CI: $p=0.038 < 0.05$) and age groups (1.345 OR; 95%CI: $p=0.006 < 0.05$) were statistically significant predictors or were significantly associated with *H. pylori* infection. In this study the prevalence of *H. pylori* infection is highest in the youngest group, because of the exacerbation of the youngest to multi substance use, and environmental hygienic condition. **Conclusion and recommendation:-**This study has shown that gastritis and *H. pylori* infection were the major problems in the study area and, therefore, further in-depth epidemiological 0research and identification of other potential environmental and personal related risk factors of *H. pylori* infection and gastritis are suggested.
Keywords: *Helicobacter Pylori*; gastritis; prevalence; risk factor; Ethiopia; retrospective study; cross–sectional study
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1. INTRODUCTION

Helicobacter pylori are a gram-negative, spiral-shaped, urease-producing bacterium with multiple unipolar flagella usually colonizes gastric pits under the mucus layer and in close association to gastric epithelial cells. Humans are a major reservoir for *H. pylori.* It is proven that *H. pylori* are the principal cause of chronic gastritis, peptic ulcer disease as well as gastric cancer (Sepulveda and Graham, 2002). Chronic gastritis and peptic ulceration are prevalent in a high magnitude throughout the world (Ghazzawi and Obidat, 2004). *H. pylori* are the principal cause of chronic active gastritis and have major complications like gastric adenocarcinoma and mucosa associated lymphoid tissue lymphoma (Ozbek *et al*., 2010).

H. pylori neutralize the acid in its environment by producing large amounts of urease, which breaks down the urea present in the stomach to carbon dioxide and ammonia, the ammonia then neutralizes stomach acid (Stingl *et al*., 2002). There are many other etiological factors such as smoking, non-steroidal anti-inflammatory drugs (NSAIDS), and reflux of gastric juice (chemical gastritis) that are also implicated to cause chronic gastritis. *H. pylori*, though is regarded as the primary cause of gastritis, it can act as a synergist in addition with other etiological factors (Parkin *et al*., 1999). A wide range of laboratory investigations are available for diagnosis of *H. pylori*. The tests belong to non-invasive group and invasive group. Non-invasive tests include urea breath test, serological Immunoglobulin G (IgG) and Immunoglobulin M (IgM) detection, saliva and urinary antibody test, and stool antigen test (Malfertheiner *et al*., 2007). The invasive tests are endoscopy based tests, which include histopathological examination, rapid urease test (RUT) and polymerase chain reaction. The role of non-invasive tests such as serology is limited in areas of high prevalence, because of non-distinction between previous and current infection (Graham and Sung, 2006).

Since *H. pylori* were first discovered by Warren and Marshall in 1983, it has radically changed our understanding and clinical management of gastro duodenal disease and much has been researched about its clinical aspects and its epidemiology (Suk, 2011). Its incidence and prevalence differs in relation to different factors like geography, age, and socio-economic factors high in developing countries and lower in the developed world (Veldhuyzen van zantel, 1995). Researchers found a consistent pattern in most developing nations, where 70 to

90% of adults harbored the bacteria; most individuals acquired the infection as children, before age ten (Hunt *et al*., 2011). Some studies have shown male predominance in infection, (Dhakhwa *et al*., 2012). Many patients still attribute symptoms of dyspepsia to diet, stress, and lifestyle factors; however, it is now proven that *H. pylori* is the principal cause of chronic gastritis and is strongly associated with peptic ulcer disease as well as gastric cancer, including gastric lymphoma (Aroori, 2001).

Ethiopia is one of the African countries in which the prevalence of the same infection is believed to be very high, which is probably attributed to the poor living conditions and overcrowding of the population (Alem Alemayehu, 2011). Study in Ethiopia '*Helicobacter pylori*, gastritis and non-ulcer dyspepsia in Ethiopia patients' the prevalence of *H. pylori* infection in Ethiopia was in the range of 56% - 70% showed that the prevalence of *H. pylori* infection in Ethiopia was in the range of 56% - 70% (Tsega *et al*., 1996). Study in Ethiopia 'Prevalence of *Helicobacter pylori* infection among adult dyspeptic patients in Ethiopia' showed that the overall prevalence of *H. pylori* infection in adult dyspeptic patients between 69 and 91% (Asrat *et al.,* 2004).But recent study in Ethiopia 'Seroprevalence of *Helicobacter pylori* infection and its risk factors among adult patients in Hawassa Teaching and referral Hospital, south Ethiopia' showed that the range of the prevalence as being 62.5-91% (Alem Alemayehu, 2011).

According to study by Abebaw *et al.* (2014), the higher cases of gastritis among the married respondents could also be due to stress experienced as people (married couples) start new independent life. The study at Jigjiga University, Jigjiga, Somali Regional State of Ethiopia, lack of awareness on the transmission ways of *H. pylori* was significantly associated with the prevalence of the infection (p= 0.025) and those who had not awareness about the transmission ways of *H. pylori* had 2.53 times higher odds of being infected with this bacterium than aware participants (Alebie G and Kaba D, 2016). Shashemene is one of the towns in West Arsi zone Oromiya region. Some of the local people in this town and its surrounding use untreated underground water which is poor in sanitation. From personal observation and communication with the society, the researcher is able to recognize that most of the people are complaining of gastritis and there was no study done particularly in the present study area. Even though gastritis is not only caused by *H. pylori* infection, people do not seem to have the information about the fact that the gastritis is also caused by bacteria. Moreover, there is a common misconception in the area that the disease gastritis has no drug for treatment.

Many local people do not think that poor sanitation, use of unclean water, and unhygienic food could be factors for acquiring the disease. They often tend to believe that it is caused only by consuming spices, acidic or alkaline foods, exposure to stressful condition, drinking alcohol(Alcohol consumption is the world's third risk factor for diseases; in middle income countries, it is the greatest risk factor (WHO, 2011)), smoking, etc. As many studies indicate, *H. pylori* are a cause of peptic ulcer, gastric cancer and mucosal associated lymphoid tissue lymphoma. In West Arsi Zone, there were no several studies done on the prevalence of *H. pylori* infection and its major risk factors particularly in the present study area. Therefore, it is important to assess the prevalence of *H. pylori* infection and its associated factors to implement appropriate public health measures targeted against the disease. The study was conducted at Shashemene referral hospital in Ethiopia.

2. MATERIALS AND METHODS

2.1. Description of the Study Area

West Arsi Zone is located in the Oromia Region of Ethiopia. The Shashemene referral Hospital is located at 250 km south of Addis Ababa, in West Arsi Zone. This referral hospital serves a catchment area of more than 2.2 million people who are living in Shashemene, Arsi Negele, and other surrounding area. The hospital was established in 1952 by missionaries as Leprosy control and treatment center. In 1968 extended to hospital (Li'ilt Tenagne works Hospital). It was handed over to the government in 1976. At present it serves as a Referral Hospital in the region and provides health care services for 2.2 million population of the catchment area. Have 165 beds for inpatient services (Medical, surgical, Pediatrics, Eye, TB and leprosy.

2.2. Study Design

This study was hospital based five years (September 2012–August 2017) retrospective study which was conducted at Shashemene referral hospital and the prevalence of *H. pylori* among upper gastrointestinal positive patients was determined. In addition to this, a cross–sectional study was conducted at Shahsemene referral hospital and the risk factors of the *H. pylori* among upper gastrointestinal positive patients who were undergo diagnosis in the H=hospital from September 2016 to August 2017 was determined using questionnaire.

2.3. Study Population

The study population was comprised of all the upper gastrointestinal patients aged ≥14 years old that were suspected for *H. pylori* infection and visited the laboratory in Shashemene referral hospital from September 2012 –August 2017. The majority of patients had dyspeptic symptoms, including epigastric pain or burning, nausea, belching, and bloating. The information on socio-demographic characteristics and other risk factors were collected from the study subjects (attending diagnosis in Shashemene referral hospital from September 2012 –August 2017) using structured questionnaire.

2.4. Sample Size Determination and Sampling Method

A 5 years retrospective data of patients undergoing upper gastrointestinal diagnosis in the Shashemene referral hospital from September 2012- Augest2017 were used. The information was collected from secondary data of the examined gastritis patients including *H. pylori* positive patient's documents recorded in the shashemene referral hospital from September 2012 – August 2017. The sample size for the cross sectional study was determined by using statistical formula and the information about risk factors was be collected from upper gastrointestinal patients that undergoing diagnosis in this Hospital from September 2016 to August 20017. The sample size was determined by using the formula provided by Daniel (2004) and the required sample size at 95% confidence level, and level of precision (5%) was determined.

$n= t^2\frac{p(1-p)}{(m)2}$Where, n= required sample size

t= confidence level at 95%= 1.96

p= estimated prevalence= 50%= expected prevalence proportion

m= desired margin of error or measure of precision= 5%

$n= (1.96)^2\frac{0.5(1-0.5)}{(0.05)2}= 3.8416\frac{0.25}{0.0025}= 384.16 = 384$ and another 10% to minimize errors arising from the likelihood of non-responsive individuals, 10% of the sample size is added to the normal sample size allow, a total of 422. 422 fresh stool samples were collected from 422 gastritis patients. Systematic random sampling method will be used to collect stool samples from both sexes and from different age groups.

2.4.1. Stool Sample Collection and examination techniques

This part of the study was done with the laboratory technicians. At the beginning of stool collection orientation regarding the handling and avoidance of contamination of stool specimens was given to all the subjects by senior laboratory technicians. Then disposable plastic cups with labels of their own unique codes and clean applicator sticks were provided to all respondents to collect fresh stool specimen. The resulting suspension was added to the sensitive test strip and examined for positive and negative results. This also used by (Shimoyama and Kato, 2009).

Standard procedure was used during stool sample collection. From each stool sample, small portions of the fecal material was taken using a sterile applicator stick which was screw on the collection tube and placed the stick in the tube and tighten securely. The samples was diluted using the extraction buffer (Buffer for *H. pylori* AG feces strip) contained in a vial and vigorously shaken by hand. The resulting diluted material will added in drops on to the test strip (*H. pylori* AG feces strip) and the results was read after 15 minutes according to the manufacture's instruction. Appearance of color band on the device on both test line and control line was interpreted as positive and as negative if it is only on the control line.

2.4.2. Data Collection

A total of 1966 subjects whose data were completely registered were included in the study. Five-year data from September 2012- August 2017 were taken from the serology log book in Shashemene referral hospital. Socio-demographic characteristics (age and sex) of the study subjects were collected using a checklist. Data of all consecutive individuals referred from outpatient as well as inpatient department which had undergone diagnosis for *H. pylori* infection and primary data from those visited the hospital in September 2016-August 2017 for various dyspeptic symptoms like pain abdomen, nausea, vomiting, belching, throat pain, upper gastrointestinal bleeding, weight loss, gastrointestinal symptoms. And copies of the structured questionnaire was distributed for 422 patient respondents to obtain information on socio-demographic factors; age, sex, residence, family size, educational level, monthly income, marital status and awareness about *H. pylori*. The questionnaire was developed in English and the translated in Afan Oromo (their local language). For those respondents who cannot read questionnaire items were read and their answers was immediately recorded by the researcher. Permission was taken from the hospital's staffs interviewed. The study was approved by the hospital ethical review committee.

2.5. Data Analysis

After the data have been collected, the raw data was analyzed. This was through coding and tabulation and then drawing statistical inference. Descriptive and frequency analysis of the data from the study was expressed as counts and percentage as appropriate to provide the overall picture. The data was analyzed using Statistical Package of Social Sciences (SPSS) version 20. Chi-square test with exact test was used where applicable. A p value of < 0.05 was considered to denote statistical significance. Qualitative data obtained from various sources was examined and presented in different forms. It was discussed under different headings, narrated and summarized. Quantitative data was edited, coded and entered into computer using SPSS analyzed. Descriptive statistics, frequencies, percentage and chi-square was under taken. Multiple response questions were analyzed so as to give frequencies and percentages. The different variables were presented with the help of Tables and graphs. After analyzed, the result was interpreted and the research report was written to communicate information. The final results were reported.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. The Prevalence of *H. Pylori* infection colonization among upper gastrointestinal patients

3.1.1.1. Socio-Demographic Characteristics of the Study subjects

As can be observed from Table1, the number of female patients was (64.6%) of which (65.03%) was *H. pylori* positive and male patients (35.4%) of which (34.97%) were H. pylori positive. The higher positive for the infection is seen in female patients which is 65.03%.The differences between *H. pylori* positivity of male and female subjects were not statistically significant (χ^2= 0.020; *P*=0.465). Besides, the majority of the patients were in the age range of 20-29 years (33.6%) of which (33.03%) was *H. pylori* positive and ≥60 years 149(7.6%) of which 46(30.9%) was *H. pylori* positive. The highest positive for the infection is seen in ≥60 year patients which is 30.9%.The differences between *H. pylori* positivity among different age groups of the subjects were not statistically significant (χ^2=7.510; *P* >0.185). Likewise, majority (60.3%) of the study participants of which 342(29%) *H. pylori* positive were rural residents and 786 (39.7%) patients of which 250(32%) was *H. pylori* positive were urban residents. The higher positive for the infection is seen in urban resident's patients which is 32%. But, it is statistically not significant with the infection (Table1).

Table1. Socio-demographic characteristics of the study participants who visited shashemene referral Hospital from September 2012- August 2017 (N=1966)

Character	Category	No. exam. (%)	Negative (%)	Positive (%)	χ^2	P-value
Sex	Male	692(35.4)	485(65.03)	207(34.97)	0.020	0.465
	Female	1274(64.6)	889(34.97)	385(65.03)		
	< 20	294(15)	216(73.5)	78(26.5)	7.510	0.185
Age groups	20-29	657(33.6)	440(66.97)	217(33.03)		
	30-39	467(23.9)	322(71.3)	145(28.7)		
	40-49	239(12.2)	179(74.9)	60(25.1)		
	50-59	150(7.7)	104(69.3)	46(30.7)		
	≥60	149(7.6)	103(69.1)	46(30.9)		
Residential	Urban	786 (39.7)	536(68)	250(32)	1.787	0.181
area	Rural	1180(60.3)	838(71)	342(29)		

3.1.2. The Prevalence of H. pylori Infection Colonization among Upper Gastrointestinal Patients from September 2012 - August 2017

This study has analyzed the Prevalence of *H. pylori* infection among different age groups and gender of year September 2012 – August 2017. As can be observed from Table1, among all the patients of five consecutive years, 692/1966 (35.4%) were males and 1274/1966 (64.6%) were females. Furthermore, the present study highlighted (figure1), 592/1966(30.3%) are *H. pylori* positive, of which 207/592 (34.97%) are males and 385/592 (65.03%) are females. The higher positive for the infection is seen in female patients which is 65.03%. The overall prevalence of five consecutive years (September 2012 – August 2017) *H. pylori* infection in this study was 30.30% (*n* = 592/1966).

As shown in Figure3, exposure to *H. pylori* seems to be higher among participants in the age group 20 – 29 years relatively (217) and lower among participants in the age group ≥60. When we see the prevalence in different years, as can be seen from Table 2, the overall prevalence of *H. pylori* in this study drops from 45.5% in September 2012 - August 2013 to 15.2% in September 2016 - August 2017.

Table2. Prevalence of *H. pylori* among age and gender from September 2012 –August 2017

Year	Age group	Gender Male No.exa	No.pos(%)	Female No.exa.	No.pos.(%)	Both sex No.exa.	No.pos.(%)
Sept.2012-Aug.2013	<20	18	9(50)	79	32(40.5)	97	41(42.3)
	20-29	84	42(50)	171	84(49.1)	255	126(49.4)
	30-39	55	23(41.8)	123	59(48)	178	82(46.1)
	40-49	28	14(50)	57	23(40.4)	85	37(43.5)
	50-59	29	13(44.8)	33	12(33.3)	62	25(38.7)
	≥60	34	21(61)	15	4(26.6)	59	25(42.4)
	Total	248	122(49.2)	488	214(43.6)	736	336(45.5)
Sept.2013-Aug.2014	<20	20	4(20)	42	2(2.8)	62	6(9.7)
	20-29	38	8(21.1)	91	38(26.5)	129	46(35.7)
	30-39	33	3(9.1)	68	18(26.5)	101	21(20.8)
	40-49	22	3(13.6)	38	4(10.5)	60	7(11.7)
	50-59	4	0(0)	17	4(23.5)	21	4(19.1)
	≥60	17	5(29.4)	10	3(30)	17	8 (47)
	Total	134	23(17.2)	266	69(25.9)	400	92(23)
Sept.2014-Aug.2015	<20	5	1(20)	18	2(11)	23	3(13)
	20-29	17	1(5.9)	20	5(25)	37	6(16.2)
	40-49	4	1(25)	14	5 (35.7)	18	18(33.3)
	50-59	2	1(50)	9	5(55.6)	11	6(54.5)
	≥60	6	2(0)	4	0(0)	10	2(0)
	Total	40	7(15)	88	23(26.1)	128	30(22.7)
Sept.2015-Aug.2016	<20	20	7(35)	25	4(16)	45	11(2.4)
	20-29	40	10(25)	63	10(15.9)	103	20(19.4)
	30-39	26	9(34.6)	34	6(17.6)	60	15(25)
	40-49	14	4(28.6)	15	3(20)	29	7(24.1)
	50-59	7	2(28.6)	17	7(41.2)	24	9(3.5)
	≥60	8	3(37.5)	11	5(45.5)	19	8(42.1)
	Total	115	35(30.4)	165	35(21)	280	70(25)
Sept.2016-Aug.2017	<20	22	2(9.1)	45	15(33.3)	67	17(25.4)
	20-29	26	9(34.6)	73	11(15.1	99	20(20.2)
	30-39	43	5(11.6)	90	14(15.6)	133	19(14.28)
	40-49	18	1(5.6)	27	3(11.1)	45	4(8.9)
	50-59	16	2(12.5)	16	0	32	2(6.25)
	≥60	30	1(3.33)	16	1(6.3)	46	2(4.35)
	Total	155	20(12.9)	267	44(16.5)	422	64(15.2)

Key: Sept., September, Aug., August, No. exam. Number of examined, No. pos. Number of positives

Regarding the sex-specific prevalence of *H. pylori*, of the 248 male patients examined for *H. pylori* from September 2012-August 2013, 122(49.2%) were positive, and of the 488 female patients examined in the same year, 214(43.6%) were found to be positive. The higher positive for the infection is seen in male patients which is 49.2%. In this year the prevalence found higher in males than in females and was statistically significant (χ^2= 4.986; *P*= 0.026). Similarly, the prevalence was higher in males 35(30.4%) than in females 35(21%) in the year Septembar2015-August 2016 was statistically significant (χ^2=3.675; *P*=0.049). However, the prevalence of *H. pylori* in the year September2014-August2015 was higher in females 23 (26.1%) than in males 7(15%) which was not statistically significant (χ^2= 0.016; *P*= 0.899). Similarly, the prevalence was higher in females 69 (25.9%) than males 23 (17.2%) in the year September2013-August 2014 and September 2016- August 2017 in females 44(16.5%) than in males 20(12.9%), but both are not significant (Table 3).

Table3. Year-specific percent distribution on prevalence of *Helicobacter pylori* among upper gastrointestinal symptomatic (dyspeptic) patients by sex at Shashemene Referral Hospital from September 2012-August 2017

Year	Male		Female		Total Exam.	Positive (%)	χ^2	P-Value
	Exam.	Positive (%)	Exam.	Positive (%)				
Sept.2012-Aug.2013	248	122(49.2)	488	214(43.6)	736	336(45.5)	4.986	0.026
Sept.2013-Aug.2014	134	23(17.2)	266	69(25.9)	400	92(23)	0.593	0.441
Sept.2014-Aug.2015	40	7(15)	88	23(26.1)	128	30(22.7)	0.016	0.899
Sept.2015-Aug.2016	115	35(30.4)	165	35(21)	280	70(25)	3.675	0.049
Sept.2016-Aug.2017	155	20(12.9)	267	44(16.5)	422	64(15.2)	0.182	0.670

Key: Sept., September, Aug., August, Exam. Examined, χ^2, Chi-square, P-value, level of significance

The prevalence of *H. pylori* infection among the symptomatic patients in Shashemene referral Hospital in the year September 2012-August 2013 was 45.5%. The prevalence decreased to 23% and 22.7%September 2013-August 2014 and September 2014-August 2015, respectively. However, there was some what a high increment in the year September 2015-August 2016 (25%). The prevalence decreased again in the year September 2016-August 2017 was 15.2%. And the frequency of the Patients was lower than the four previous years. Generally, in this study, the researcher found high but fluctuating prevalence of *H. pylori* infection among symptomatic patients (Table 3).

3.1.3. Prevalence of *H. Pylori* Infection among Different Age and Gender Groups of Year September 2012-August 2017

As it can be observed from the figure 6 below, the overall frequency of *H. pylori* infection among different gender and age groups from September 2012-August 2017 was 30.30%. The distribution of colonization in <20 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, and ≥60 years age groups was 26.53%, 33.03 %, 31.05%, 25.1%, 30.7%, and 30.9% respectively. The majority of the patients were in the age range of 20-29 (33.03%), 30-39 (31.05%), ≥ 60 (30.9%), and 50-59 (30.7) (Figure 6). As can be seen from figure 6, compared to the other age groups in both male and females, the age group 20-29 and 30-39 years old showed relatively higher prevalence. The prevalence of *H. pylori* in this study was highest in the ≥60 age group (30.9%) and lowest among <20 age group (26.5%). Similarly, the overall prevalence among male and female was slightly similar (29.9% and 30.2%, respectively) (figure 6). As a general, during this consecutive five years the result indicated that the frequency of the infection is highest in the age range of ≥60 (30.9%) and age range of 20-29 (33.03%) is the second highest.

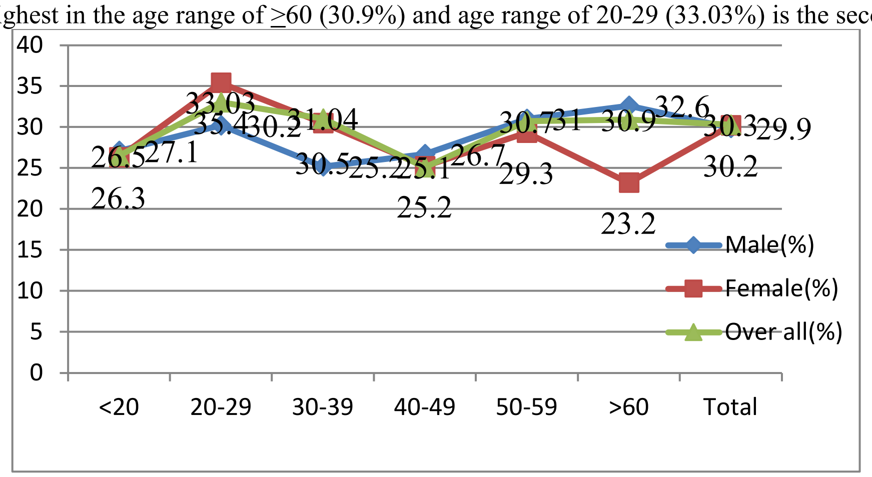

Figure 6. Prevalence of *H. pylori* among different gender and age groups of year September 2012 - August 2017

3.1.4. The Status of *H. pylori* Infection in Shashemene Town and Its Surroundings from September 2012 to August 2017

As it can be observed from figure 7 below, the total frequency of *H. pylori* infection among the five years and gender from September 2012-August 2013 was higher in females (214) and 122 in males. In general, during this consecutive five years the results indicated that the frequency of the infection was highest in the first year September 2012-August 2013 (336) and decreased in the next 4 years.

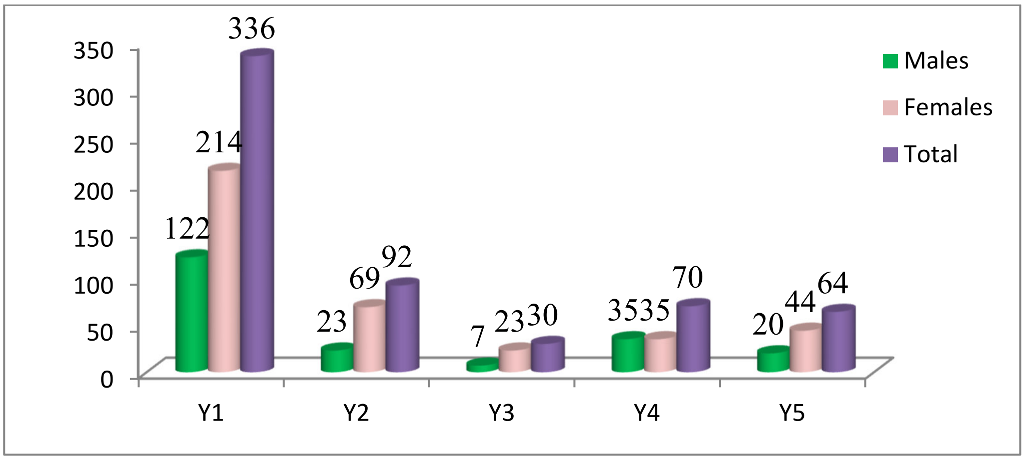

Figure7. The Status of *H. pylori* Infection among the study participants Who Visited Shashemene Referral Hospital from September 2012 to August 2017. Y1- Sep.2012-Aug.2013; Y2- Sep.2013-Aug.2014;Y3- Sep.2014-Aug.2015;Y4- Sep.2015-Aug.2016;Y5- Sep.2016-Aug.2017

3.1.5. *H. pylori* Infection and Its Associated Risk Factors among Patients Undergoing Upper Gastrointestinal Diagnosis in Shashemene Referral Hospital from September 2016 to August 2017

3.1.5.1. Prevalence of H. pylori Infection among Gastritis Patients Visiting Shashemene Referral Hospital from September 2016 to August 2017

As shown in the figure below, of a total of 422 study participants, 84.8% negative and overall 15.2% antigens of *H. pylori* were detected.

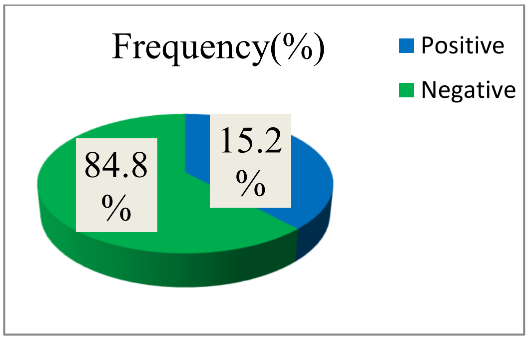

Figure 8. Frequency and percentage of the gastritis patients visiting Shashemene referral hospital from September 2016 to August 2017

The prevalence of *H. pylori* infection by age among gastritis patients visiting Shashemene referral hospital from September 2016 to August 2017 is shown in table 4 below. The majority of the respondents were in the age range of 30-39 years 133 (31.5%) and 20-29 years 99(23.5%) **(**Table4). For this the relationship across 6 age groups of patients were examined, the highest positive for the infection is seen in age group less than 20 which is 25.4%. For the participants it can be seen that the test statistic value for Pearson chi-square is 14.997, 5 degrees of freedom and, as the *p* value is smaller than 0.005, it was concluded that there is a significant association between the infection and this age group.

The prevalence of *H. pylori* infection by sex among gastritis patients visiting Shashemene referral hospital from September 2016 to August 2017 is also showed in the table 4 below. The results showed that the number of female was higher 267(63.3%) of which 44(16.9) were *H. pylori* positive than male patients 155 (36.7%) of which 20(13.5%) were *H. pylori* positive males and 44(16.9%) females (Table 4).For this the relationship across 2 groups of patients, males and females were examined, the highest positive for the infection is seen in females which is 16.9%. For the participants it can be seen that the test statistic value for Pearson chi-square is 0.975, 1 degrees of freedom and, as the *p* value is greater than 0.005, then it can be concluded that the association of the infection and the different sex group is not statistically significant.

The prevalence of *H. pylori* infection by level of by family size among gastritis patients visiting Shashemene referral hospital from September 2016 to August 2017 is shown in the table 4 below. Most of the study participants have family size of ≥4 that was 372 (88.2%) persons per house hold only 50 (11.8%) study participants have family size of <4. For this the relationship across 2 groups of patients, <4 and ≥4 family size were examined, the highest positive for the infection is seen in the Family size of ≥4 which is (88.2%). For the participants it can be seen that the test statistic value for Pearson chi-square is 0.060, 1 degrees of freedom and, as the *p* value is greater than

0.005, then it can be concluded that this pattern of scores is not significant.

The Prevalence of *H. pylori* infection by educational level among gastritis patients visiting Shashemene referral hospital from September 2016 to August 2017 is shown in the table 4 below. The majority of the participants were able to read and write 311(73.7%) while the rest were illiterate 30(7.1%) and diploma and above 81(19.2%) of which Illiterate 5(16.7%), read and write 45(14.5%), diploma and above 14(17.3%) are *H. pylori* patients (Table 4). For this the relationship across 3 groups of patients, Illiterate, Can read and write and diploma and above were examined, the highest positive for the infection is seen in those diploma and above which is 14(17.3%). For the participants it can be seen that the test statistic value for Pearson chi-square is 0.452, 2 degrees of freedom and, as the *p* value is greater than 0.05, then it can be concluded that this pattern of scores is not significant.

The prevalence of *H. pylori* infection by Monthly income among gastritis patients visiting shashemene referral hospital from September 2016 to August 2017 is shown in the table 4 below. Most of the study participants have monthly income of < 700ETB 292(69.2%) of which 40(13.7%) are *H. pylori* positive and the rest 130(30.8%) of which 24(18.55%) are *H. pylori* positive have Monthly income of ≥ 700ETB.But those with ≥ 700ETB monthly income 24(18.55%) were relatively higher *H. pylori* positivity. For the participants it can be seen that the test statistic value for Pearson chi-square is 1.586, 1 degrees of freedom and, as the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is not significant.

Table 4. Association of socio-demographic and socioeconomic factors with prevalence of *H. pylori* infection in gastritis patients in Shashemene Referral hospital from September 2016 August 2017

		Total (%)	No. *H.pylori* +ve (%)	χ^2	df	P value
Age group	<20	67(15.9)	17(25.4)	14.997	5	0.010
	20-29	99(23.5)	20(20.2)			
	30-39	133(31.5)	19(14.3)			
	40-49	45(10.7)	4(8.9)			
	50-59	32(7.6)	2(6.3)			
	> 59	46(10.9)	2(4.3)			
Food usually makes pain	raw vegetable	138(32)	23(16.7)	1.110	3	0.775
	protein rich food	201(47.6)	31(15.4)			
	Carbohydrate rich food	2(.5)	0(0)			
	Fats and oils	81(19.2)	10(12.3)			
Educational level	Illiterate	30(7.1)	5(16.7)	0.425	2	0.798
	Can read and write	311(73.7)	45(14.5)			
	Diploma and above	81(19.2)	14(17.3)			
Sex of the patient	Male	155(36.7)	20(13.5)	0.975	1	0.323
	Female	267(63.3)	44(16.9)			
Family size	<4	50(11.8)	7(14)	0.060	1	0.807
	≥4	372(88.2)	57(15.3)			
Monthly income	< 700ETB	292(69.2)	40(13.7)	1.586	1	0.208
	≥ 700ETB	130(30.8)	24(18.5)			

3.1.5.2. Respondents' level of perceptions on factors aggravating gastritis

Responses of study participants to some possible factors that might aggravate gastritis visiting Shashemene referral hospital from September 2016 to August 2017 are shown in the table 5 below. For this the relationship across 5 groups of patients, smoking, drinking alcohol, Eating spicy food, hunger, stress and anger were examined, the highest positive for the infection is seen in patients with stress and anger which is 34(17.4%) and Eating spicy food which is 13(16.1%). For the participants it can be seen that the test statistic value for Pearson chi-square is 4.158, 1 degrees of freedom and, as the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is not significant.

Table 5**:** Distribution of some possible factors aggravating *H. pylori* positive gastritis among the study participants

		Total (%)	No. *H.pylori* +ve (%)	χ^2	df	P value
Gastritis aggravate	smoking	17(4)	2(11.8)	4.158	4	0.323
	drinking alcohol	16(3.8)	0(0)			
	Eating spicy food	81(19.2)	13(16.1)			
	Hunger	113(26)	15(13.3)			
	Stress and anger	195(46.2)	34(17.4)			

3.1.5.3. The proportions of respondents exposed to potential risk factors that contributed to H. pylori infection

The proportion of respondents exposed to factors that might have contribution to *H. pylori* infection is shown in table 6. The percentage of respondents who had good awareness about their personal hygiene and environmental sanitation 81(19.2%) was lower than that of the respondents who had poor awareness about their personal hygiene and environmental sanitation 341(80.8%).But, the highest positive for the infection is seen in respondents who had good awareness about their personal hygiene and environmental sanitation which is 17(21%).

The percentage of respondents who had awareness about *H. pylori* were 81(19.2) of which 13(16.0) were *H. pylori* positive and those who had no awareness about *H. pylori* were 341(80.8) of which 51(15) were *H. pylori* positive. But, the highest positive for the infection is seen in respondents who had awareness about *H .pylori* which is 13(16.0).

The source of water used by most respondents was unprotected well water 178(42.2%). Only 139 (32.9%) of the respondents were obtaining their drinking water from tap water. The highest positive for the infection is seen in respondents who used spring water which is 26.3%. As the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is statistically not associated with the infection.

Most of them had no toilet 260(61.6%) of which 37(14.2%) were *H. pylori* positive and only 162(38.4%) had toilet of which 27(16.7%). The highest positive for the infection is seen in respondents who had toilet which is 16.7%. As the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is statistically not associated with the infection.

About 259 (61.4%) of the respondents were from rural of which 37(14.3) were *H.pylori* positive and 163(38.6) were from urban of which 27(16.6%) were *H.pylori* positive. The highest positive for the infection is seen in patients from urban of which is16.6%. As the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is statistically not associated with the infection.

Interestingly, the majority 244(57.8%) of the respondents of which 35(14.3%) were *H. pylori* positive revealed that they do not share utensils with their family members and 178(42.2%) of the respondents of which 51(28.7%) *H.pylori* positive were share utensils with their family members. The highest positive for the infection is seen in patients do not share utensils with their family members which were 28.7%(table 6).As the *p* value is greater than 0.005, then it can be concluded that this pattern of scores is statistically not associated with the infection.

Table6**:** Association of personal habits with prevalence of *H. pylori* infection in gastritis patients in Shashemene referral hospital from September 2016- August2017

		Total (%)	No. *H.pylori* +ve (%)	χ^2	df	P value
Have toilet	Yes	162(38.4)	27(16.7)	0.460	1	0.497
	No	260(61.6)	37(14.2)			
Awareness about *H. pylori*	Yes	81(19.2)	13(16.0)	0.061	1	0.805
	No	341(80.8)	51(15)			
Share utensils with gastritis patients in home	Yes	178(42.2)	51(28.7)	0.61	1	0.805
	No	244(57.8)	35(14.3)			
Awareness of personal hygiene and environmental sanitation	poor	341(80.8)	47(13.8)	2.641	1	0.104
	good	81(19.2)	17(21)			
Place of residence	Urban	163(38.6)	27(16.6)	0.404	1	0.525
	rural	259(61.4)	37(14.3)			
Use drinking water from	River	67(15.9)	8(11.9)	4.653	3	0.199
	well water	178(42.2)	24(13.5)			
	spring water	38(9)	10(26.3)			
	tap water	139(32.9)	22(15.8)			

3.1.5.4. Association between Prevalence of H. Pylori Infections and Its Major Associated Risk Factors among Gastritis Patients Visiting Shashemene Referral Hospital from September 2012- August 2017

The distribution of *H. pylori* in different risk factors is indicated in Table 7. Of different risk factors considered in this study, marital status of the patients accounted the bigger number (2.793 OR; 95%CI: p=0.038 < 0.05). This is statistically significant predictors or was significantly associated with *H. pylori* infection. The higher cases of gastritis among the married respondents could also be due to stress experienced as people (married couples) start new independent life. The next largest value was for age groups (1.345 OR; 95%CI: p=0.006< 0.05) which is also significantly associated with the infection. Age groupsand marital status were one and two times more likely associated with the infection *H. pylori*.The third next largest value is sharing of utensils accounted the bigger number (1.431 OR; 95%CI: p= 0.403> 0.05). However, this is not statistically significant predictors or is not significantly associated with *H. pylori* infection. Most of the study participants were from rural residents 259 (61.4%) (Table7). For this the relationship across 2 groups of patients, urban and rural were examined. For the participants it can be seen that the *p* value is greater than 0.005, then it can concluded that this pattern of scores is not significant. Other risk factors like family size, monthly income, gastritis aggravate,awareness of personal hygiene and environmental sanitation,usually wash hands with soap after latrine, awareness about *H. pylori,*having toilet,food usually makes pain and source of drinking water were not statistically significant (P> 0.05) or were not significantly associated with *H. pylori* infection.

Table7. Association, prevalence of *H. pylori* infection and socio-economic, socio-demographic and personal habits factors with prevalence of *H. pylori* infection in gastritis patients in Shashemene referral hospital from September 2016- August 2017

	Total (%)	No.of *H.pylori* +ve (%)	Exp(B)	95% CI.for EXP(B) Lower	Upper	p-value
Age group						
<20	67(15.9)	17(25.4)	1.345	1.090	1.660	0.006
20-29	99(23.5)	20(20.2)				
30-39	133(31.5)	19(14.3)				
40-49	45(10.7)	4(8.9)				
50-59	32(7.6)	2(6.3)				
>59	46(10.9)	2(4.3)				
Sex of the patient						
Male	155(36.7)	20(13.5)	0.913	0.505	1.650	0.763
Female	267(63.3)	44(16.9)				
Place of residence						
Urban	163(38.6)	27(16.6)	1.089	0.308	3.856	0.895
Rural	259(61.4)	37(14.3)				
Family size						
< 4	50(11.8)	7(14)	0.854	0.280	2.606	0.781
≥4	372(88.2)	57(15.3)				
Educational level						
Illiterate	30(7.1)	5(16.7)	1.283	0.528	3.120	0.582
Can read and write	311(73.7)	45(14.5)				
Diploma and above	81(19.2)	14(74.3)				
Monthly income						
<700 ETB	292(69.2)	40(13.7)	1.072	0.356	3.226	0.901
≥700 ETB	130(30.8)	24(18.5)				
Marital status of the patients						
Married	246(58.3)	44(17.9)	2.793	1.057	7.380	0.038
Not married	176(41)	20(11.4)				
Gastritis aggravate						
Smoking	17(4)	2(11.8)	0.746	0.505	1.103	0.142
Drinking alcohol	16(3.8)	0(0)				
Eating spicy food	81(19.2)	13(16.1)				
Hunger	113(26)	15(13.3)				
Stress and anger	195(46.2)	34(17.4)				
Food usually makes pain						
Raw vegetable	138(32)	23(16.7)	1.071	0.778	1.475	0.673
protein rich food	201(47.6)	31(15.4)				
Carbohydrate rich food	2(.5)	0(0)				
Fats and oils	81(19.2)	10(12.3)				
Use drinking water from						
River	67(15.9)	8(11.9)	0.681	0.387	1.198	0.182
well water	178(42.2)	24(13.5)				
spring water	38(9)	10(26.3)				
Tap water	139(32.9)	22(15.8)				
Sharing of utensils						
yes	341(80.8)	51(15)	1.431	0.618	3.310	0.403
no	81(19.2)	13(16)				
Awareness about *H. pylori*						
yes	81(19.2)	13(16.0)	0.910	0.313	2.643	0.862
No	341(80.8)	51(15)				
Have toilet						
yes	162(38.4)	27(16.7)	0.704	0.227	2.180	0.543
No	260(61.6)	37(14.2)				

Usually wash hands with soap after latrine						
yes	178(42.2)	29(16.3)	0.773	0.237	2.516	0.669
No	244(57.8)	35(14.3)				
Awareness of personal hygiene and environmental sanitation						
poor	341(80.8)	47(13.8)	0.616	0.197	1.928	0.406
good	81(19.2)	17(21)				

3.2. DISCUSSION

In the current study, the five consecutive year's prevalence of the *H. pylori* infection and its associative risk factors examined and a Socio-Demographic characteristic of the study Patients was noticed. The number of female patients was 64.6% of which 65.03% was *H. pylori* positive and male patients was 35.4% of which 34.97% was *H. pylori* positive. The higher positive for the infection is seen in female patients which is 65.03%.The differences between *H. pylori* positivity of male and female subjects in the current study was not statistically significant (P=0.465). In line with this study finding, the study done by Khan *et al.* (2017) showed sex specific prevalence in female was 61.6% which was significantly high from that of males 38.4%. Furthermore, it is also parallel to the study reported by Alebie G and Kaba D (2016) that showed the prevalence among male was 68.5 % and among female was 75.5 % but, gender was not significantly associated with *H. pylori* infection (p = 0.371).

The majority of the patients were in the age range of ≥60years of which 30.9% was *H. pylori* positive and 20-29 years of which 33.03% was *H. pylori* positive. The highest positive for the infection is seen in 20-29 year patients which is 33.03%.The differences between *H. pylori* positivity among different age groups of the subjects were not statistically significant (P >0.185), which is parallel to the study by Khan *et al.* (2017) age wise distribution showed maximum prevalence in the age group of 15-25 years (84.2%) followed by >65years (83%).

Majority (60.3%) of the study participants of which 29% *H. pylori* positive wererural residents and 39.7% patients of which 32%*H. pylori* positive were urban residents. The higher positive for the infection is seen in urban resident's patients which is 32%. However, it was statistically not significant with the infection. Interestingly, among all the symptomatic patients of five consecutive years, the 30.3% were *H. pylori* positive, of which 34.97% are males and 65.03% are females. However, recent population and hospital based studies in different parts of Ethiopia showed that the prevalence ranged 62.5- 91% (Alem Alemayehu, 2011).

According to study by Hunt *et al. (2011*), one half of the world's population has *H. pylori* infection, with an estimated prevalence of more than 90% in developing countries. The overall prevalence of five consecutive years (September 2012 – August 2017) *H. pylori* infection recorded in this study was 30.3%, which is slightly similar to the figures reported in Canada 29.4% (Naja *et al.,* 2007). This lower prevalence can be explained by the fact that the researcher has estimated prevalence of *H. pylori* infection in symptomatic patients only. Several studies showed conflicting findings, it is lower in comparison to a study conducted in a tertiary care hospital in India, 208 individuals were screened for *Helicobacter pylori* which were positive in 44.23 % of both symptomatic and asymptomatic individuals (Rastogi *et al.,* 2015). Similarly, the result of current study was lower than the figure reported in Ethiopia range from56-70% (Tsega *et al*., 1996). It is also not agreed with results reported from Ethiopia and elsewhere; 49**-** 70% in Bair Dar (Tadege *et al.,* 2005), 47% in Karachi (Jafri *et al.,* 2010); 49.7% in Kuwait (Alazmi *et al.,* 2010) and 46.6% in Iran (Jafarzadeh *et al.,* 2017). The finding was also lower than other results reported from Ethiopia; 83.3% in Hawassa (Tadesse *et al*. ,2014); 81 **-**89% in Addis Ababa (Asrat *et al.*, 2004, Desta *et al*., 2007); 85.6% in Gondar (Moges *et al.*, 2006) and elsewhere in the world, 66% in Kenya (Shmuely *et al.*, 2003). Further, the present finding was found to be lower than the figures reported in Greenland 43% (Koch *et al.,* 2005).

The overall prevalence of *H. pylori* in this study drops from 45.5% in September 2012 - August 2013 to 15.6% in September 2016 - August 2017. McJunkin *et al*. (2011) also reported a dramatic drop in *H. pylori* prevalence from 65.8% to 6.8% over an 11-year period. Regarding the sex-specific prevalence of *H. pylori*, of the male patients examined for *H. pylori*September2012-August 2013, 49.2% were positive, and of the female patients examined in the same year, 43.6% were found to be positive. The higher positive for the infection is seen in male patients which is 49.2%. In this year the prevalence found higher in males than in females was statistically significant (χ^2= 4.986; P= 0.026). Similarly, the prevalence was higher in males 30.4% than in females 21% in the yearSeptember2015-August2016 was statistically significant (P=0.049). However, the prevalence of *H. pylori* in the year September2014-August2015 was higher in females 26.1% than in males 15% which was not statistically significant (P= 0.899). Similarly, the prevalence was higher in females 25.9% than males 17.2% in the yearSeptember2013-August2014 and September 2016- August 2017 in females 16.5% than in males 12.9%, but both are not significant.

Approximately, 50% of the normal populations across the world harbor *H. pylori*, though only 10-20% of them become symptomatic (Omunakwe *et al*., 2011). The prevalence of *H. pylori* infection among the symptomatic patients in Shashemene referral Hospital in the year September 2012-August 2013 was 45.5%.The prevalence decreased to 23% and 22.7%September 2013-August 2014 and September 2014-August 2015, respectively. However, there was some what a high increment in the year September 2015-August 2016was 25%. The prevalence decreased again in the year September 2016-August 2017 was 15.2%. And the frequency of the Patients was lower than the four previous years. Generally, in this study, the researcher found high but fluctuating prevalence of *H. pylori* infection among symptomatic patients.

The distribution of colonization in <20 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years, and ≥60 years age groups was 26.53%, 33.03 %,31.05%, 25.1%, 30.7%, and 30.9% respectively. The majority of the patients were in the age range of 20-29 (33.03%), 30-39 (31.05%), ≥60(30.9%), and 50-59(30.7%).In line with current findings, Hunt *et al*. (2011) also found that in most developing nations, 70 to 90% of adults harbored the bacteria. In contrast, a similar Indian study conducted by Kumar *et al.*(2006) showed maximum prevalence in the age group of 36-45 years (43.47%) and minimum in the age group of 66-75 years (3.26%).According to Ddine *et al*. (2012), in situations where there is high stress and anxiety, the secretion of HCl increases and causes erosion of the stomach. Compared to the other age groups in both male and females, the age group 20-29 and 30-39 years old showed relatively higher prevalence showing the uniqueness of the age groups in the lifestyle because these were the ages at which most people in Ethiopia shoulder family and social responsibilities and hence encounter real challenges in life which in turn might lead to stressful can change gastric motility, a very hot intake leads to congestion (burden) of mucosa and raise the secretion of acid. This result is in agreement with the study by Khan *et al.*(2017) age wise distribution showed maximum prevalence in the age group of 15-25 years 84.2% followed by >65years 83% and minimum in the age group of 55-65 (25%).

The increase in prevalence observed in this study from young age <20 (26.5%) to adult age ≥60 (30.9%) for both sexes. Similarly, Alem Alemayehu (2011) reported that *H. pylori* infection rate was higher in adult population than in children and that the prevalence increased with age. The prevalence of *H. pylori* infection in this study was highest in the ≥60 age group 30.9%and lowest among <20 age group 26.5% which is similar to the study by Ozen *et al*. (2011), on children and adolescents in Asia showed prevalence rates ranging from 20% to 84%. Similarly, the overall prevalence among male and female in this study was slightly similar 29.9% and 30.5%, respectively.This is consistent with studies in Ethiopia (Tadege *et al.,* 2005, Mathewos *et al.,* 2013, Tadesse *et al.,* 2014). But it is inconsistent with the study (Khan *et al.* 2017) in which sex specific prevalence in female was 61.6% which was significantly high from that of males 38.4%. It is also not in agreement with previous studies shown by others in Kenya (Shmuely *et al.* 2003), and Ethiopia (Abebaw *et al.,* 2014).

The total frequency of *H. pylori* infection in September 2012-August 2013, September 2013-August 2014 and September 2014-August 2015 were 45.5%, 23% and 22.7% respectively. And the majority of the patients in the previous two years were in the age range of 20-29 (56%), 30-39 (46%) and 20-29 (35.7%), 30-39(20.8%) respectively. And the frequencies of the patients in September 2014-August 2015 were lower than the previous two years. The total frequency of *H. pylori* infection in September 2015-August 2016 was 25%. And the majority of the Patients were in the age range of ≥60 (42.1%) and 30-39 (25%). The total frequency of *H. pylori* infection in September 2016-August 2017 was 15.2%. And the frequency of the Patients was lower than the four previous years. In the age range of <20 (25.4%) and 20-29 (20.2%), it is higher relatively. This evidence showed that the infection is decreasing. Interestingly, the overall frequency (prevalence) of *H. pylori* infection among different gender and age groups from September 2012-August 2017 was 30.3%. The total frequency of *H. pylori* infection among the five years and gender from September 2012-August 2013 was higher in females 214and 122 in males. As a general, during this consecutive five years the result indicated that the frequency of the infection is highest in the first year September 2012-August 2013 (335) and decreased in the recent 4 years.

Furthermore**,** the *H. pylori* infection and its associated risk factors among patients undergoing upper gastrointestinal diagnosis in shashemene referral hospital from September 2016 to august 2017 were noticed. From a total of 422 study participants, 84.8% negative and overall 15.2% antigens of *H. pylori* were detected. The results showed that the number of infected female was higher 16.9% than infected males13.5%**.**The highest positive for the infection is seen in age group less than 20 which is 25.4%. There is a significant association between the infection and this age group ($p<0.05$). In contrast, there was no sex difference (Shi *et al*., 2008).

Most of the study gastritis participants visiting Shashemene referral hospital from September 2016 to August 2017 have family size of ≥4 that was 88.2% of which 15.3% *H. pylori* positive persons per house hold and only 11.8% of which 14% *H. pylori* positive study participants have family size of <4. The highest positive for the infection is seen in the Family size of ≥4 which is 15.3%. This pattern of scores is not significant ($p>0.05$), which is parallel to other studies in Ethiopia (Abebaw *et al*., 2014), but this study is different from other studies elsewhere (Shmuely *et al.,* 2003).This could be attributed to overcrowding of family and scarcity of resource (e.g source of water). For some, they were stressed when they started their new independent life. Using a statistical inference model, Strebel *et al*. (2010), found “more than three children living in the household”, “more persons living per m^2 than average”, “home situated at main road” and “using well water” to be strongly associated with *H. pylori* infection. Ethiopia is one of the African countries in which the prevalence of the same infection is believed to be very high. This is probably attributed to the poor living conditions and overcrowding of the population (Alem Alemayehu, 2011).

Similar results were observed recently by Laszewicza *et al.* (2014), (Hu *et al.* 2013) and Zaterka *et al.*(2007) reported that crowding, type of drinking water, lack of toilet during childhood, lower family income, and lower educational level has a positive association. In contrast, this study found no association between *H. pylori* and socio-economic status. Similar results were observed in study in China (Shi *et al.,* 2008) and Benin (Aguemon *et al.,* 2005). In a study from Brazil, Dattoli *et al*. (2010) reported increased *H. pylori* infection with a larger number of siblings, nursery schooling, and housing in a street without paved roads and without flushed toilets indicating impoverished living conditions associated with poorer sanitation and overcrowding to be risk factors for *H. pylori* infection. Similarly, Fialho *et al*. (2010) demonstrated the number of people per room and number of children in the household as independent risk factors for *H. pylori* infection.

Most of the study participants earning a monthly income of < 700ETB 292(69.2%) of which 40(13.7%) are *H.pylori* positive and the rest 130(30.8%) of which 24(18.55%) are *H.pylori* positive have Monthly income of ≥ 700ETB. But those with ≥ 700ETB monthly income were relatively higher *H. pylori* positivity. As the *p* value is greater than 0.005, this pattern of scores is not significant. Results observed recently by Laszewicza *et al.* (2014), Hu *et al.* (2013) and Zaterka *et al*. (2007) showed that crowding, type of drinking water, lack of toilet during childhood, lower family income, and lower educational level has a positive association. These results are slightly similar to an important and interesting study from USA; Epplein *et al.* (2011) reported a high *H. pylori* prevalence rate of 79.0% among a subpopulation of poor Americans. Alcohol consumption is the world's third risk factor for diseases; in middle income countries, it is the greatest risk factor (WHO, 2011)

The prevalence of *H. pylori* infection by age among gastritis patients visiting shashemene referral hospital from September 2016 to August 2017 was noticed. The majority of the respondents were in the age range of 30-39 years (31.5%) and 20-29 years (23.5%). For this the relationship across 6 age groups of patients were examined, the highest positive for the infection is seen in age group less than 20 which is 25.4%. There is a significant association between the infection and this age group (p<0.005). Moreover, the prevalence of *H. pylori* infection by sex among gastritis patients visiting Shashemene referral hospital in the same year was noticed and association of the infection and the different sex group is not statistically significant (p>0.005).This is in agreement with the gender wise distribution of *H. pylori* seropositivity study (Khan *et al.* 2017), which constitute 27 (52.94%) males and 24(47.06%) females (OR=1.537). In the study by Alebie G and Kaba D (2016), among1371 subjects, 851(62%) were *H. pylori* positive. However, no significant differences in the prevalence of *H. pylori* infection by gender were noted (P = 0.3). Similarly, the prevalence of *H. pylori* infection among the study participants was 71.0 %. The prevalence among male was 68.5 % and among female was 75.5 %. However, gender was not significantly associated with *H. pylori* infection (X^2= 0.799; p = 0.371).

The majority of the gastritis participants visiting Shashemene referral hospital from September 2016 to August 2017 was able to read and write 73.7% while the rest were illiterate 7.1% and diploma and above 19.2% of which Illiterate 16.7% read and write 14.5%, diploma and above 17.3% are *H. pylori* patients. The highest positive for the infection is seen in that diploma and above which is 17.3%. Statistically significant difference was not obtained for educational attainment(x^2= 0.452, p= 0.798 > 0.05) which is in agreement to studies (Shi *et al.,* 2008, Aguemon *et al*., 2005) and inconsistent to other studies (Shmuely *et al*., 2003, Abebaw *et al.,* 2014). Similarly, in the study by Dilnessa Tebelay and Amentie Muluwas (2017), no significant association was observed in the prevalence of *H. pylori* with family size, educational status and marital status (p>0.05), but a statistically significant association was observed between *H. pylori* infection and residence (p<0.05), which is inconsistent with the current study.

H. pylori infection and perceived symptom's aggravating factors (smoking, drinking alcohol, Eating spicy food, hunger, stress and anger) that might aggravate gastritisvisiting shashemene referral hospital from September 2016 to August 2017 was also noticedand the highest positive for the infection is seen in patients with stress and anger habits which is 17.4% and Eating spicy food which is 16.1%. As the *p* value is greater than 0.005, then this pattern of scores is not significant.7

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 South Africa (Tanih *et al*., 2010) andChina (Shi *et al.,* 2008).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 (Moges *et al.,* 2006, Abebaw *et al.,* 2014). Despite no significant association observed, life style factors such as smoking, drinking, hunger, stress and anger, ingestions of spicy foods and drugs were found to aggravate symptoms of *H. pylori* gastritis than *H. pylori* negative gastritis. 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. According to the data obtained by Megan (2006), in northern Canada prevalence of Gastritis from alcohol user 43%, fruit and vegetable user 49%, and smoker user was 52%.Other studies done in Ethiopia by Moges (2006) and Abebaw *et al.* (2014) showed alcohol, the type and amount of alcohol consumed has effect on the association.

The percentage of respondents who had good awareness about their personal hygiene and environmental sanitation 19.2% was lower than that of the respondents who had poor awareness about their personal hygiene and environmental sanitation 80.8%. But, the highest positive for the infection is seen in respondents who had good awareness about their personal hygiene and environmental sanitation which is 21%. In a study from Brazil, Dattoli *et al*. (2010) reported increased *H. pylori* infection with a larger number of siblings, nursery schooling, and housing in a street without paved roads and without flushed toilets indicating impoverished living conditions associated with poorer sanitation and overcrowding to be risk factors for *H. pylori* infection.

The percentage of respondents who had awareness about *H. pylori* were 19.2% of which 16% were *H.pylori* positive and those who had no awareness about *H. pylori* were 80.8% of which 15% were *H. pylori* positive. But, the highest positive for the infection is seen in respondents who had awareness about *H. pylori* which is 16.0%. In contrast, the study at Jigjiga University, Jigjiga, Somali Regional State of Ethiopia, lack of awareness on the transmission ways of *H. pylori* was significantly associated with the prevalence of the infection (p= 0.025) and those who had not awareness about the transmission ways of *H. pylori* had 2.53 times higher odds of being infected with this bacterium than aware participants (Alebie G and Kaba D, 2016).

According to the study by Brown (2000),*H. pylori* in drinking water would be an important source of risk factor, pointing to a fecal–oral route of spread and *H. pylori* may be transmitted orally by means of fecal matter through the ingestion of waste-tainted water, so a hygienic environment could help decrease the risk of *H. pylori* infection. The source of water used by most respondents in this study was unprotected well water 178(42.2%). Only 139 (32.9%) of the respondents were obtaining their drinking water from tap water. The highest positive for the infection is seen in respondents who used spring water which is 26.3%. This pattern of scores is statistically not associated with the infection (p>0.05).Using statistical inference model, Strebel *et al*. (2010), found “using well water” to be strongly associated with *H. pylori* infection. Brown (2000) reported that*H. pylori* may be transmitted orally by means of fecal matter through the ingestion of waste-tainted water, so a hygienic environment could help decrease the risk of *H. pylori* infection.

Most of them had not toilet 260(61.6%) of which 37(14.2%) were *H. pylori* positive and only 162(38.4%) had toilet of which 27(16.7%) was *H. pylori* positive. The highest positive for the infection is seen in respondents who had toilet which is 16.7%. This pattern of scores is statistically not associated with the infection (p>0.05). Results observed recently by Laszewicza *et al.* (2014), Hu *et al.* (2013) and Zaterka *et al*. (2007) showed that crowding, type of drinking water, lack of toilet during childhood, lower family income, and lower educational level has a positive association.

About 259 (61.4%) of the respondents were from rural of which 14.3% were *H. pylori* positive and 163(38.6) were from urban of which 16.6% were *H. pylori* positive. The highest positive for the infection is seen in patients from urban which 16.6%. This pattern of scores is statistically not associated with the infection (p>0.05).But, Abebaw *et al. (*2014) reported Slight higher prevalence observed in rural residences, but no statistically association occurred in previous studies in Ethiopia. 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.

Interestingly, the majority 244(57.8%) of the respondents of which 14.3% were *H. pylori* positive revealed that they do not share utensils with their family members and 178(42.2%) of the respondents of which 28.7% were *H.pylori* positive share utensils with their family members. The highest positive for the infection is seen in patients do not share utensils with their family members which are 28.7%. This pattern of scores is statistically not associated with the infection (p>0.05). Lack of awareness about *H. pylori*infection in the study area may increase the prevalence of *H. pylori* infection; since the local people do not give care for the infection. In the same way using unprotected well water and sharing of utensils also increased the risk of transmission of bacteria within family.

From different risk factors considered in this study, marital status of the patients accounted the bigger number (2.793 OR; 95%CI: p=0.038 < 0.05. This is statistically significant predictors or was significantly associated with *H. pylori* infectionwhich is in line with study in Northwest Ethiopia (Abebaw *et al*., 2014); in this case marital status was associated with prevalence of *H.pylori*, but different from other studies in Ethiopia (Moges *et al.,* 2006) and China (Shi *et al.,* 2008). According to study by Abebaw *et al.* (2014), the higher cases of gastritis among the married respondents could also be due to stress experienced as people (married couples) start new independent life. The next largestvalue was for age groups (1.345 OR; 95%CI: p=0.006< 0.05 which is also significantly associated with the infection. But, no association was found between infection and age (Aguemon *et al*., 2005).The third next largest value is Sharing of utensilsaccounted the bigger number (1.431 OR; 95%CI: p= 0.403> 0.05. However, this is not statistically significant predictors or is not significantly associated with *H. pylori* infection. But other risk factors like family size, monthly income, gastritis aggravate, Awareness of personal hygiene and environmental sanitation,usually wash hands with soap after latrine, awareness about *H. pylori,*having toilet,food usually makes pain and source of drinking water were not statistically significant (P> 0.05) or were not significantly associated with *H. pylori* infection. Similarly, the prevalence *H.pylori* antibodies was 75.4% in the urban population and 72.3% in rural residence (p= 0.459) and no association was found between infection and education level, size of house hold, economic activity or source of drinking water (Aguemon *et al*., 2005). This is also similar with the study at Jigjiga University, Jigjiga, Somali Regional State of Ethiopia, lack of awareness on the transmission ways of *H. pylori* was significantly associated with the prevalence of the infection (p=0.025). Furthermore, those who had not awareness about the transmission ways of *H. pylori* had 2.53 times higher odds of being infected with this bacterium than aware participants (Alebie G and Kaba D, 2016). Married patients of *H. pylori* had 2.793 times higher odds of being infected with this bacterium than unmarried participants. Al-Sulami *et al*. (2010) reported for the first time the occurrence of *H. pylori* in treated drinking water (2.0% of total isolates) in Basra, Iraq. But other risk factors like Family, Income, Aggravate, pain, share, Toilet, wash were not statistically significant (P> 0.05) or were not significantly associated with *H. pylori* infection.Consistent with the current study, from a total of 230study participants in the study at Assosa GeneralHospital, West Ethiopia, overall 48.7% antigens of *H.pylori* were detected and there was no significant association among age groups, family size, educational status, marital status, toilet use habit, occupation, Alcohol drinking, coffee consumption, cigarette smoking and khatchewing with *H. pylori* infection (p>0.05), but statistically significant association was observed between *H. pylori* infection and residence (p<0.05) (Dilnessa Tebelay and Amentie Muluwas, 2017).

4. CONCLUSION

The main objective of this study was to determine the prevalence of five consecutive years of *H. pylori* infection and its associated risk factors among patients undergoing upper gastrointestinal diagnosis in Shashemene referral Hospital from September 2012 – August 2017. The design of the study was Hospital-based retrospective and cross-sectional study conducted at Shashemene referral Hospital. The overall findings of this study showed that *H. pylori* were highly prevalent and most serious health problem in the study area. The overall prevalence of five consecutive years (September 2012 – August 2017) of *H. pylori* infection recorded in this study was 30.3%. The higher positive for the infection is seen in female. The overall prevalence drops from 45.5% in September 2012 - August 2013 to 15.6% in September 2016 - August 2017. The higher positive for the infection is seen in urban resident's patients which were 32%. The majority of the patients were in the age range of 20-29 and ≥60 years. The increase in prevalence observed in this study from young age <20 to adult age ≥60 for both sexes. The researcher found high but fluctuating prevalence of *H. pylori* infection among symptomatic patients through the five years. After screening of 422 stool samples during September 2016 to August 2017 in this study, overall 15.2% antigens of *H. pylori* were detected (64 of 422 gastritis patients). The highest positive for the infection is seen in age group less than 20 which was 25.4%. There is a significant association between the infection and age group (p<0.05). Moreover, association of the infection and the different sex group is not statistically significant (p>0.005).

The highest positive for the infection is seen in the Family size of ≥4 which is 15.3%. Most of the study participants were earning a monthly income of < 700ETB. But those with ≥ 700ETB monthly income were relatively higher *H. pylori* positivity. For the gastritis participants visiting shashemene referral hospital from September 2016 to August 2017, the highest positive for the infection is seen in diploma and above which is 17.3%. Statistically significant difference was not obtained (p > 0.05).

H. pylori infection and perceived symptoms that might aggravate gastritis were smoking, drinking alcohol, Eating spicy food, hunger, stress and anger. The highest positive for the infection is seen in patients with stress and anger habits which were eating spicy food, but this pattern of scores is not significant (p> 0.05).

Despite no significant association observed, life style factors such as smoking, drinking, hunger, stress and anger, ingestions of spicy foods and drugs were found to aggravate symptoms of *H. pylori* gastritis than *H. pylori* negative gastritis. Furthermore, despite no significant association observed, the highest positive for the infection is seen in respondents who had good awareness about their personal hygiene and environmental sanitation, good awareness about *H. pylori*, used spring water, toilet, urban and do not share utensils with their family members. Marital status of the patients (2.793 OR; 95%CI: p=0.038 < 0.05) was statistically significant predictors or was significantly associated with *H. pylori* infection. Age groups (1.345 OR; 95%CI: p=0.006< 0.05) was also significantly associated with the infection. Other risk factors like Sharing of utensils, family size, monthly income, gastritis aggravate, Awareness of personal hygiene and environmental sanitation, usually wash hands with soap after latrine, awareness about *H. pylori,* having toilet, food usually makes pain and source of drinking water were not significantly associated with *H. pylori* infection(P> 0.05).

As a result of this study the prevalence of *H. pylori* infection is highest in the youngest group, because of the exacerbation of the youngest to multi substance use, excessive alcohol drinking or other related substances and environmental hygienic condition. This large group is in society vulnerable to the infection in Shashemene town and its surroundings.

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