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Detection of *Helicobacter pylori* among gastritis patients attending Nemba district hospital

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Abstract

Background: *Helicobacter pylori* (*H. pylori*) is a small, spiral-shaped bacterium that lives in the surface of the stomach and duodenum. More than half of the world's population is colonized with *H. pylori* in the gastric mucosa which is the major cause of chronic gastritis, peptic ulcer and also the most important etiological factor responsible for the duodenal and gastric ulcer and has an important role in the pathogenesis leading to gastric cancer. **Objectives:** The objectives of this study was to determine the prevalence of *H. pylori* among gastritis patients at Nemba district hospital, to compare sex prevalence level of *H. pylori* among gastritis patients and determine the prevalence of *H. pylori* among gastritis patients according to the age of gastritis patients. **Methods:** This study involved 140 patients with gastritis who attended Nemba district hospital from August to October 2018. The samples were collected and *H. pylori* rapid test strip was performed for all patients to diagnose *H. pylori* among gastritis patients. **Results:** Findings of the study showed that the prevalence of *H. pylori* infection was found to be significantly high among female participants than male participants. Despite high prevalence in females, the findings showed that there was no statistical significance of sex with *H. pylori* infection ($\chi^2 = 0.6$ and $p > 0.05$, $p = 0.1$). On basis of age, the prevalence of *H. pylori* infection was found to be high among participants and the prevalence increase between young age and old age. Results show that there was statistical significance between age and *H. pylori* infection with $\chi^2 = 1.2$ and $p > 0.05$, $p = 0.04$. the group of individuals with that ≥ 45 years old were more affected compared to other age groups and the prevalence of *H. pylori* infection was increased in older patients than younger patients. Our study showed an overall prevalence of *H. pylori* among gastritis patients was (45.7% $n = 140$). **Conclusion**: *H. pylori* infection is terrible burden of public health and affect people of all age and sex. *H. pylori* infection was significantly high in females and significance was found in age group of patients. Number of people are carrier of this terrible bacterium, thus hospitals are recommended to carry out early diagnosis to avoid later complication of infection.

Keywords: *Helicobacter pylori (H. pylori), Gastric cancer, Infection, Gastritis*

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1. Introduction

Helicobacter pylori (H. pylori) is micro-aerophilic spiral-shaped highly motile and possesses four to six lophotrichous flagella gram-negative bacteria which known by scientists that it colonizes human stomach and its pathogenesis leads to serious gastrointestinal illness. *H. pylori* is contagious, although the exact route of transmission is not known but person to person transmission by either the oral-oral or fecal-oral route is most likely *H. pylori* are the most important etiological factor responsible for chronic gastritis, duodenal and gastric ulcer and have an important role in the pathogenesis of gastric cancer (Moharram *et al*., 2015).

The presence of *H. pylori* induces a chronic, active inflammation in the mucosa via the release of chemokines and cytokines (such as interleukin-8, tumor necrosis factor-a, and interleukin-1b). due to the release of chemokines and cytokines, immune system become compromised and unable to eradicate the organism and instead leads to persistent gastric mucosal damage. A variety of virulence factors contribute to *H. pylori* ability and capacity to cause mucosal damage. *H. pylori* infect at least half of the world's population and this making it the most widespread infection in the world. Infections are usually acquired in early childhood in all countries. However; the infection rate of children in developing nations is higher than in industrialized nation, and this is due to low sanitary conditions (Rangaswamy *et al*., 2016).

The prevalence of *H. pylori* is very high in the developing world and low in the developed world; its prevalence is occurred differently in relation to geographical location, ethnicity, age, and socioeconomic characteristics. The indication of epidemiological studies has been shown that almost 50% of adults people in developed world and 90% of adults in developing world are positive to *H. pylori*. This infection is common in African countries and is a leading cause of more than 90% of duodenal ulcers and 70% of gastric ulcers. Number of studies was conducted and showed the high seroprevalence of this infection (61-100%) and variation was seen according regions, racial group in every country. Surprisingly, above 50% of children in Africa are infected at the age of 10 (Alebie and Kaba, 2016).

In Rwanda and the other parts of great lakes region, little research has been conducted on *H. pylori* infection with the only on previous study published more than two decades ago showing 75% as *H. pylori* infection prevalence in the population study. Thus, this study was conducted at the main endoscopy center for southern Rwanda to see the level of the prevalence of *H. pylori* and the frequency of major diagnoses at endoscopy, and to examine their association. The results of this study revealed that there was no difference in prevalence comparing to the study conducted three decades earlier in Kigali city, Rwanda (Walker *et al*., 2014). However, the prevalence of gastric cancer in Rwanda was about 5% and the major risk factor for that gastric malignancy is *H. pylori* (Brown *et al*., 2000).

The major top primary disorder associated with *H. pylori* infection is chronic active gastritis that occurs in almost 20% of infected individuals and have seen to be a leading factor of secondary complications among pylori infected people. It has been shown by various researches that 50% of *H. pylori* infected individuals develop non-atrophic gastritis while another half of these people develops atrophic gastritis, and this is a condition that facilitate the development of intestinal metaplasia and progression to gastric carcinoma. Around 15% develop peptic ulcer disease, defect in gastrointestinal mucosa, duodenal ulcer disease and small number of individual develop gastric cancer or stomach cancer (Noah *et al*., 2012).

In Rwanda, the burden of *H. pylori* infection rate was 75% among individuals suffering from gastritis, 20% of duodenal ulceration was shown by the endoscopic diagnoses among these patients (Walker *et al*., 2014).

2. Materials and methods

2.1. Study design

This study was conducted at Nemba district hospital and targeted gastritis patients admitted for *H. pylori* diagnosis from August to October 2018. All patients who were diagnosed clinically with and or suspected (whose request form indicated need for *H. pylori* test) of having gastritis, attending Nemba district hospital during the period of this study were considered to be part of target population. 140 patients suffered or suspected from having gastritis were used to collect blood samples for *H. pylori* test.

2.2. Sample collection

Whole blood was collected by venipuncture in sodium heparin tubes, centrifuged using centrifuge equipment.

A total of 140 blood samples were collected from the patients to check if there was *H. pylori* antibodies in patient's serum sample.

2.2.1. Blood Sample for serological evaluation and analysis

About 5 ml of venous blood were collected from patients in a red top tube with no anticoagulant. The tube was labeled with the patient name, number and date of sample collection. The clotted blood was centrifuged and serum aspirated for being tested. The blood specimen was analyzed using the *H. pylori* rapid test strip. This a rapid chromatographic immunoassay for the qualitative detection of antibodies to *H. pylori* (anti-Hp IgG) serum. Individuals infected with *H. pylori* have serum antibodies. The *H. pylori* rapid test strip (serum) is a simple test that uses a combination of *H. pylori* antigen coated particles and anti-human IgG to qualitatively and selectively detects *H. pylori* antibodies in serum.

2.2.2. Testing procedures

The test, specimen, buffer, and / or controls was allowed to attain the room temperature (15-30 °C) before being tested. Bag is brought to the room temperature before being opened. The test cassette was removed from the sealed bag and use it as soon as possible. The test cassette was placed on a clean and level surface. After specimen centrifugation, a pastor pipette was used to pipette the serum or plasma from the blood collection tube. Then the pastor pipette with serum or plasma was held vertically and transfer two drops of serum or plasma (approximately 50 μL) to the specimen well (S) of the test cassette, then the addition of one drop of buffer to the specimen well (S). Then the timer was started. Saw illustration below.

For venipuncture whole blood specimens was held the dropper vertically and transfer two drops of whole blood (approximately 50 μL) to the specimen well (S) of the test cassette, then add one drop of buffer and the timer was started. Saw illustration below. For finger stick whole blood specimens was filled the capillary tube and transfer approximately 50 μL of finger stick whole blood to the specimen well (S) of the test cassette, then add one drop of buffer and the timer was started. Saw illustration below. Wait for the colored line(s) to be appeared. The results were read at 10 minutes.

2.2.3. Results interpretation

Positive test: two lines appear. One colored line should be in the control region (C) and another apparent colored line should be in the test region (T). A positive result indicates that *H. pylori* antibodies were been detected. Negative test: one colored line appears in the control line region (C). No line appears in the test line region (T). A negative result indicates that the specimen contains no *H. pylori* antibodies. Invalid test was observed when control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure. Review the procedure and repeat the test with a new test. If the problem persists, discontinue using the test kit immediately and contact your local distributor.

Note: The intensity of the color in the test line region was vary depending on the concentration of *H. pylori* antibodies in the specimen. Therefore, any shade of color in the test line region should be considered positive. Please note that this is a qualitative test only, and cannot determine the concentration of analytes in the specimen. And also insufficient specimen volume, incorrect operating procedure or expired tests are the most likely reasons for control line failure.

3. Results

3.1. Demographic characteristics of the participants

Demographic characteristics and frequencies of the study population are described in Table 1.

In relation to the age of study participants as illustrated in Table 1, findings revealed that out of 140 patients, 3.6% were in the age group of <15 years, 22.7% in the age group of 15-30 years, 29.3% in the age group 30-45 years, the majority of the participants (44.3%) were in the age group of greater or equal to 45 years. And also indicates that (55%) were female patients and (45%) were male patients.

3.2. Prevalence of H. pylori among gastritis in patients

The prevalence of *H. pylori* among gastritis attending Nemba district hospital was determined and findings are presented in Figure 1 below:

Table 1: Distribution of the study population according to the age-groups and sex

			Sex of Patients		Total
			Female	Male	
Age of patients	<15	Frequency	3	2	5
		% of Total	2.10%	1.40%	3.60%
	[15-30]	Frequency	18	14	32
		% of Total	12.90%	10.00%	22.90%
	[30-45]	Frequency	18	23	41
		% of Total	12.90%	16.40%	29.30%
	≥ 45	Frequency	38	24	62
		% of Total	27.10%	17.10%	44.30%
Total		Frequency	77	63	140
		% of Total	55.00%	45.00%	100.00%

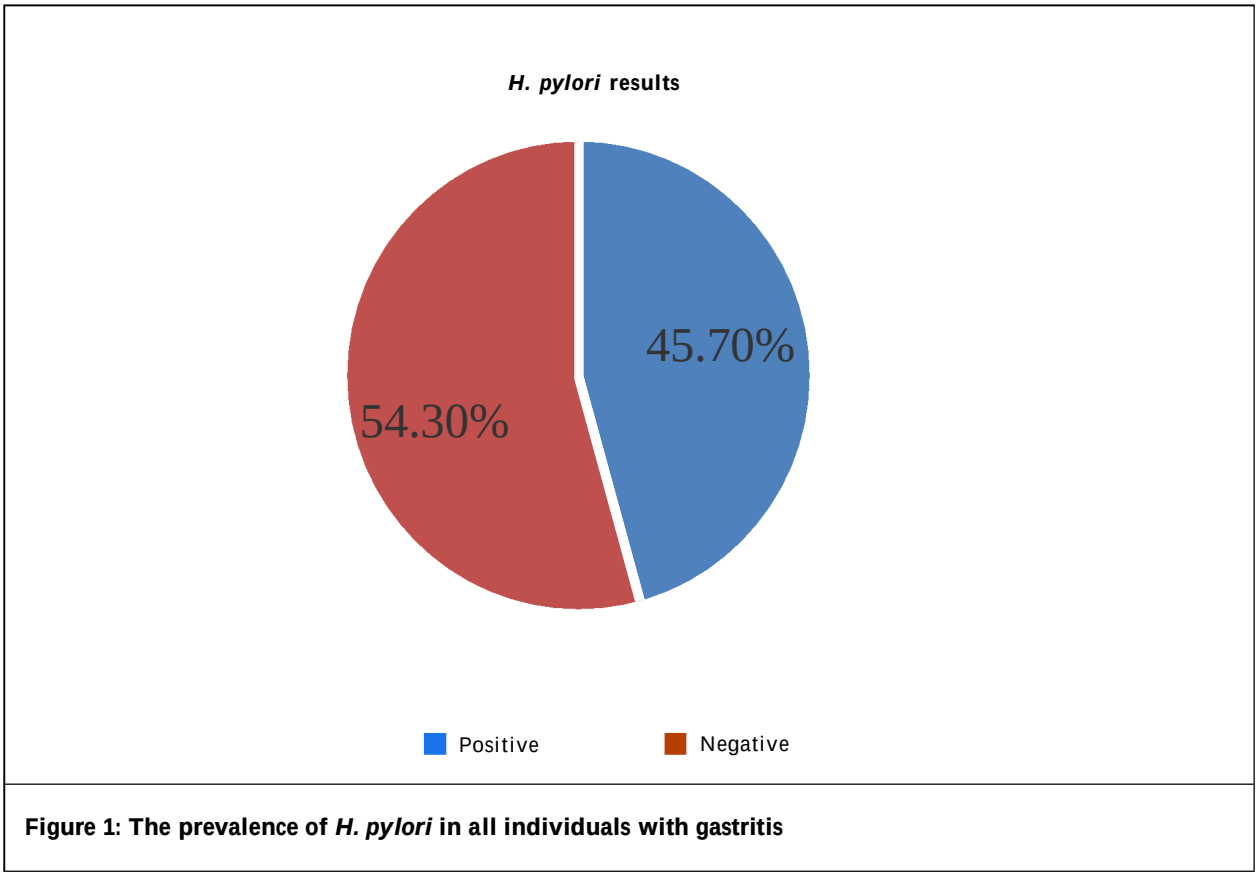

Figure 1: The prevalence of *H. pylori* in all individuals with gastritis

Results from this Figure1 shows that during the time of conducting this study, the prevalence of *H. pylori* infection among the gastritis patients was detected in patients and shows the prevalence of 45.7% of the total detected patients considered in the study.

3.3. Prevalence of H. pylori infection according to the age groups of patients

The prevalence of *H. pylori* according to the age was determined and findings are presented in Figure 2 below.

Finding in this figure indicates that 3.60% of the patients aged less 15 years old and 1.20% of them were *H.*

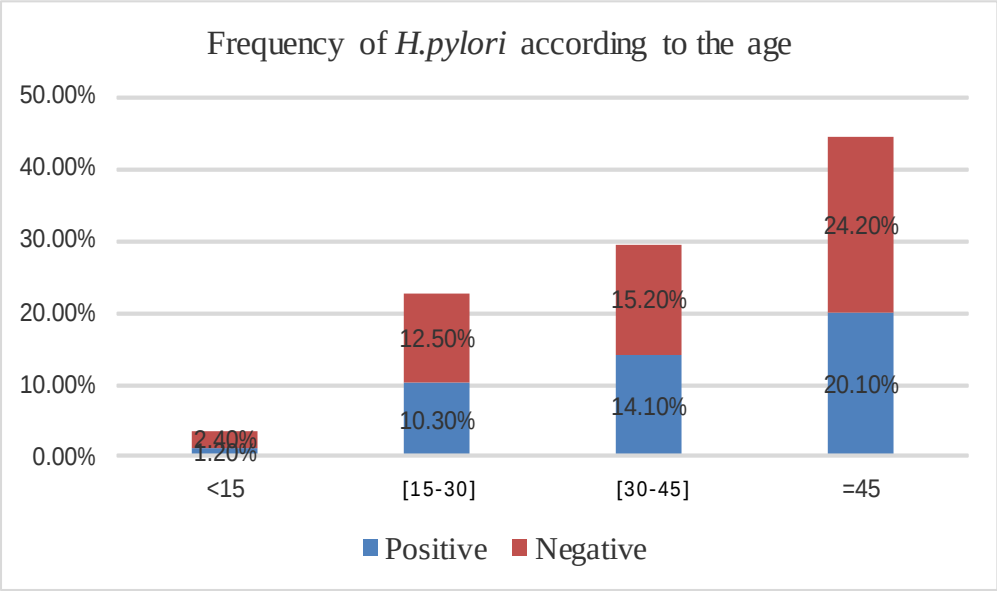

Figure 2: Prevalence of *H. pylori* infection according to the age groups of patients

pylori infected, 22.3% of patients aged [15-30] years old, 10.30% were *H. pylori* infected. 29.3% of patients aged [30-45] years old and 14.10% were *H. pylori* infected. 44.3% of patients aged ≥ 45 years old and 20.10% of them were *H. pylori* infected Between age and *H. pylori* infection $\chi^2 = 1.2$ and $p = 0.04$. This figure indicates that the prevalence of *H. pylori* infection in age groups range ≥ 45years old were high prevalence of *H. pylori* when compared to other age groups, this could be due to immune suppression in old age.

3.4. Prevalence of H. pylori according to the sex of the patients

The prevalence of *H. pylori* according to the sex was determined and findings are presented in Figure 3 below.

Findings of the above figure shows that (55%) were female patients, among of them 26.4% were infected by *H. pylori*. There was 45% of male patients, and 19.30% were infected by *H. pylori*.

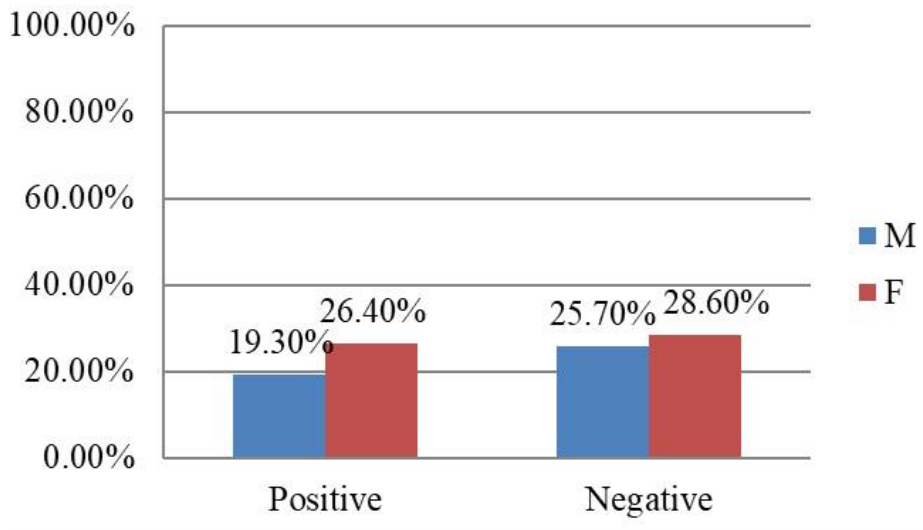

Figure 3: **Prevalence of *H. pylori* according to the sex of the patients**

4. Discussion

4.1. Prevalence level of H. pylori among gastritis patients according to sex

This study was conducted at Nemba district hospital and targeted 140 patients undergoing *H. pylori* rapid test strip. Data concerning sex were obtained and recorded. The study population of (55%) was females and (45%) was males. The distribution of the respondents in relation to sex indicated that females were higher in number than males. These findings are in agreement with the study conducted by Jemilohun *et al*. (2010) that showed that male gastritis patients were less than females gastritis patients, among 86 subjects, there were 39 (45.3%) males and 47 (54.7%) females.

Findings indicate that 26.40% were female gastritis patients infected by *H. pylori* and 19.30% were male gastritis patients infected by *H. pylori* results. Also shows that there was no statistical significant difference between sex and *H. pyori* infection since $\chi^2 = 0.6$ and $p > 0.05$. Agbor *et al*. (2018) in his study, demonstrated that female patients were more infected by *H. pylori* than males. Among *H. pylori* positive patients 43.4% were males and 45.5% were females there was no statistically significant between males and females. Olokoba *et al*. (2013) in his study indicates that 49 (39.2%) male patients were less infected than 76 (60.8%) females. This is agreement with the present study in which 26.40% of females and 19.30% of males were *H. pylori* induced antibodies tested positive and $\chi^2 = 0.6$, $p = 0.1$, showing that there was no statistical significant association with sex. This means that in present study females were more susceptible to *H. pylori* infection than males. Despite the proof of statistical significant of the current study, females were more affected. The present study and other study conducted as discussed above show that there is no association between sex and *H. pylori* infection. The issue is, why do women suffer from *H. pylori* infection while no statistical significance? Despite objectives of the study that did not consider risk factors for *H. pylori* infection, women are mostly exposed to *H. pylori* infection compared to men. Gestational period, child bearing age and related factors could be some of factors that expose women at high risk of *H. pylori* infection.

4.2. The prevalence of H. pylori among gastritis patients according to the age

In this study 140 patients undergoing *H. pylori* rapid test strip. Data concerning age were obtained. Findings indicate that 1.2% of the patients aged less 15 years old were *H. pylori* infected, 10.3% of patients aged [15-30] years old, 14.1% of patients aged [30-45] years old, 20.1% of patients aged greater or equal 45 years old were *H. pylori* infected. The prevalence of *H. pylori* infection in age groups range ≥ 45years old had a high prevalence of *H. pylori* when compared to other age groups. There was statistical significant between age and *H. pylori* infection since $\chi^2 = 1.2$ and $p < 0.05$ this study showed that the prevalence of infection increase with the age. It should be understood that children and old age people are at high risk of infection due to their immunity level.

Compared to the study done by Adlekha *et al.* (2013), it was similar because results indicated that out of 47 patients from (0-15) age group, (19.15%) were diagnosed *H. pylori* infection, (15-30) age group, (26.09%) were diagnosed *H. pylori* infection. Also this results showed that out of 23 patients from (30-45) age group, (73.91%) were diagnosed *H. pylori* infection and greater 45 age group (80.85%) *H. pylori* infection. This study is agreement with study done by Correa *et al*. (2016) in their study demonstrated that the prevalence of *H. pylori* infection was found to be higher among participants that were 45-70 years old when compared to other age groups. These results showed that there was no significant difference between age groups and *H. pylori* infection. Age is a matter to *H. pylori* infection among population and continue to grow with lowest diagnosis and screening in developing world.

4.3. Prevalence of H. pylori among gastritis in patients

The present study showed the prevalence of 45.7%, a finding that is similar to what was found in China and Thailand but different from what was found in the South Africa is 42%. Approximately 80% are infected by *H. pylori* but in the tropic over 80% of the population are infected. For instance, in Nigeria is 82%, Algeria 79%, Ivory cost is 71% and in Vietnam is 65.6% while in Australia is 1% (Oyedeji, 2015). The prevalence of *H. pylori* infection in Ethiopia was in the range of 56-70% (Tadesse *et al*., 2014). Studies have shown a higher prevalence among people in developing countries than developed countries and show that *H. pylori* is the most causes of bacterial infection in human beings (Rothenbacher and Brenner, 2003). *H. pylori* infection can increase depending on geographical location, ethnic group, and other different factors.

5. Conclusion and Recommendations

5.1. Conclusion

H. pylori infection occurs worldwide, but the prevalence of *H. pylori* is closely to age and sex, *H. pylori* infection increase with age. Approximately 20.1% greater or equal 45 ages are infected with *H. pylori*, according to results of this study, the rate of *H. pylori* infection among 140 subjects undergoing *H. pylori* rapid test strip was 45.7%. The prevalence of *H. pylori* infection among gastritis patients at Nemba district hospital is high. This prevalence indicates that was one of the most factors lead to gastritis, the females are more level to this infection than makes. However, and there was no statistical significant different association of *H. pylori* infection and sex.

5.2. Recommendations

Based on the results of the study, it is recommended that further investigation to detect the possible risk factors associated with *H. pylori* infection among population of all age. It is also recommended to use endoscopy and rapid urease test for *H. pylori* diagnosis. All district hospitals are recommended at least using *H. pylori* rapid test strip as simple diagnosis test for *H. pylori* rapid test strip. It is recommended that all gastritis patients to do screening for *H. pylori*, because many people are carrier for this bacterium.

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