

## Prevalence of Helicobacter Pylori Infection among Gastric and Non-Gastric Ulcer Patients of Tamale Teaching Hospital, Ghana

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### Abstract

**Background:** Half of the world population is estimated to be infected with *H. Pylori* and most of them originate from developing countries as compare to those in developed countries.

**Objective:** The prevalence of *H. pylori* among gastric and non-gastric patients in Tamale Teaching Hospital.

**Methodology:** Descriptive retrospective survey was adopted be for this study. Data entry and analysis was than using SPSS version 20. Data presentation was done through tables and figures using percentages and frequencies categorical variables. Two variable analyses were done using chi-square at confidence level of 95%.

**Results:** 100 cases were reviewed for the study, 50 for gastric ulcer and 50 for non-gastric, majority (55.0%) of the participants were males. The prevalence of *H. Pylori* among all the participants was 55.0%. The prevalence was high (76.0%) among gastric patients. There was significant association between type ulcer and presence of *H. Pylori* infection, 6.15 (2.57 – 14.73). After adjusting for age, sex, marital status and location, absence of *H. pylori* infection was now likely only 0.12 times in gastric patient as compare to non-gastric patients [AOR = 0.12, 95% (0.045 – 0.320)]. Absence of Peptic ulcer complication was likely 0.2 times in gastric patient as compare to non-gastric patients [AOR = 0.2, 95% (0.045 – 0.884)].

**Conclusion:** The prevalence of *H. pylori* infection among peptic ulcer patient was more than average and was high among gastric cases. Peptic ulcer complication was more likely among gastric ulcer.

**Keywords:** Gastric, *H. Pylori*, non-gastric, and prevalence

### 1. INTRODUCTION

*Helicobacter pylori* (*H. pylori*) are type of Gram-negative rod bacterium which dwells in the individual gastric milieu [1]. This type of bacteria colonize in the stomach and incite a local inflammation in almost all host, uninterrupted process increases the threat of developing atrophic gastritis, intestinal metaplasia, and non-cardiac gastric adenocarcinoma [2]. According to Atherton & Blaser, gastric cancer is the fourth most common caused by *Helicobacter pylori*; this cancer is responsible for second most common death related to cancer [3].

Half of the world population is estimated to be infected with *H. Pylori* and most of them originate from developing countries as compare to those in developed countries [4]. In developing countries the prevalence *H. pylori* infection is high among low economic population due to their poor hygiene practices, crowded living environment and inadequate or

poor sanitation [5]. The prevalence of *H. pylori* in Africa is high and account for at least 90% of duodenal ulcers and 70% of gastric ulcers [5]. Archampong et al., study in Ghana revealed a *H. Pylori* infection prevalence of 74.8% among the study participants [6].

Mabeku et al., (2018) revealed overall prevalence of *H.pyloric* in their respondents to be 64.4% and all patients with upper abdominal pains and frequent burping were *H. pylori* seropositive.7 Majority (90%) of *H. pylori* infected patients usually remain subclinical and the infection can persist throughout life if untreated [7]

*Helicobacter pylori* infections are influenced by so many factors such age, economic status, social status, blood group, NSAIDS use, environmental and personal hygiene, family history and smoking habit [8].

There is a scarcity of information about the prevalence of *H. pylori* and associated risk factors in Tamale. Northern Region was chosen

because of its poor economic status and poor sanitation and hygiene practice that favour the spread of H. Pylori infection. It was therefore important to conduct this hospital-based cross-sectional study to generate recent data on H. pylori prevalence and complication associated with gastric and non-gastric patients to help inform management, prevention and control measures.

## 2. METHODS AND MATERIALS

Descriptive retrospective survey was adopted for this study in Tamale Teaching Hospital, Ghana. A case inclusion criterion was peptic ulcer case with H. pylori test done and for the year 2019. And 100 cases meet the inclusion criteria for the study, 50 of them gastric patients and 50 non-gastric patients. Structured checklist was used to collect data patients' records. The checklist used was divided into demographic characteristics, type ulcers, presence of H. pylori infection, duration and complications related to ulcer disease.

## 3. STATISTICAL ANALYSIS

**Table 1.** Demographic Characteristics of Study Participants

		Frequency	Percentage
Age group	10-20 years	15	15.0%
	21-30 years	30	30.0%
	31-40 years	20	20.0%
	Above 40 years	35	35.0%
Sex	Male	55	55.0%
	Female	45	45.0%
Location	Rural	21	21.0%
	Urban	25	25.0%
	Peri-Urban	54	54.0%
Marital status	Single	40	40.0%
	Married	60	60.0%

**Source:** field study, 2020

The prevalence of NSAIDS use among the peptic ulcer patients was 71.0% and there was no significant difference in terms use among gastric and non-gastric study participants, proportionally 70.0% for gastric and 72.0% for non-gastric.

## Prevalence of H. Pylori among Gastric and Non-Gastric Patient

Out of the 100 studied cases, 50 were gastric ulcer patients and the remaining 50 were non-gastric ulcer patients. In total 55 (55.0%) of the results of the study participants was positive for H. pylori infection, indicating a prevalence of 55.0% of H. pylori infection for the study participants. The prevalence of H. pylori was

Data entry and cleaning was done using Microsoft excel, SPSS version 20 was used for data analysis. Descriptive analysis was done using frequency, percentages, tables and figures. Two variable analyses were done using Chi-square analysis. Confidence level adopted for this study was 95%.

## 4. ETHICAL CONSIDERATIONS

Clearance to conduct this study was authorised by the research department of Tamale Teaching Hospital. All sources for information used in this research will be duly acknowledged to avoid any form of plagiarism.

## 5. RESULTS

### Demographic Characteristics

Majority (35.0%) of the respondents were 40 years and above and the age group with least number of participants was 10 – 20 years. Majority (55.0%) of the respondents were males and most (54.0%) of them were from peri-urban. About 60.0% of the participants were married (**Table 1**).

high (76.0%) among gastric participants and less (34.0%) among non-gastric participants.

### Association Between Studied Demographic Characteristics and H. Pylori Infection

The age group with large (66.7%) proportion of them infected with helicobacter pylori was 10 - 20 years and the age group with least (46.7%) infection was 21 – 30 years (p = 0.599). With respect to the sex of the participants 60.0% the males were infected (p = 0.267). In terms of location majority (64.0%) of those from urban communities were infected with H. pylori (p = 0.518). Also infection was high (59.0%) among participants who were single (P = 0.463) (**Table 2**).

**Table2:** Chi-square relationship between participant demographic characteristics and H. pylori infection

		Presence of H. pylori				X <sup>2</sup>	df	P-value
		Present		Absent				
Age group	10-20 years	10	66.7%	5	33.3%	1.876	3	.599
	21-30 years	14	46.7%	16	53.3%			
	31-40 years	12	60.0%	8	40.0%			
	Above 40 years	19	54.3%	16	45.7%			
Sex	Male	33	60.0%	22	40.0%	1.235	1	.267
	Female	22	48.9%	23	51.1%			
Marital status	Single	23	57.5%	17	42.5.0%	0.168	1	.682
	Married	32	53.3%	28	46.7%			
Location	Rural	10	47.6%	11	52.4%	1.317	2	.518
	Urban	16	64.0%	9	36.0%			
	Peri-Urban	29	53.7%	25	46.3%			

Source: field study, 2020

**Association between Type of Ulcer and Helicobacter Pylori Infection**

Analysis revealed a significant relationship between type of peptic ulcer and the presence of H. pylori infection, with the odds ratio of 6.15 (2.57 – 14.73). Meaning H. pylori infection was six (6) times likely in gastric patient as compare to non-gastric patients. After adjusting for age, sex, marital status and location, H. pylori

infection absence was now likely only 0.12 times in gastric patient as compare to non-gastric patients [AOR = 0.12, 95% (0.045 – 0.320)]. The logistic regression model appropriately explained the outcome variable (presence H. pylori infection) because the Hosmer-Lemeshow goodness-of-fit test p-value was more than 0.05, (X<sup>2</sup>(8) = 7.645, p = .318), hence the model fits the study data (Table 3).

**Table3:** Logistics regression of factor associated with H. pylori infection

	B	Wald	Sig.	Exp(B)	H-L GOF test	
					Lower	Upper
					X <sup>2</sup> (8)= 7.645, P =.318 95% C.I. for EXP(B)	
Above 40 years		5.280	.152			
10-20	-.592	.540	.462	.553	.114	2.679
21-30	1.167	2.583	.108	3.213	.774	13.336
31-40	.291	.188	.665	1.338	.358	5.005
Male/Female	-.536	1.261	.261	.585	.229	1.491
Peri-urban		2.581	.275			
Rural	.838	1.707	.191	2.312	.658	8.133
Urban	-.280	.239	.625	.756	.246	2.322
Single	.634	.960	.327	1.885	.530	6.696
Gastric/ Non-gastric	-2.120	17.905	<b>.000</b>	<b>.120</b>	<b>.045</b>	<b>.320</b>
Constant	-.358	.066	.797	.699		

Source: field study, 2020

**Duration of Ulcer Condition**

Majority (82%) of the participants’ had the disease duration to be less than less than 12 months, 12% of them had the disease duration to be 12-35 months and 6% had it for more than 35 month. Majority (92.0%) of the complications were related to those with non-gastric ulcer (p = 0.032).

**Complications Related to Ulcer Disease**

About 16.0% of the participants experience complications related peptic ulcer disease. From the 16 complications experienced by study

participants 7 (43.0%) were perforations, 4 (25.0%) were gastric outlet obstruction, 3 (18.8%) were melena stools and finally 2 (12.5%) were upper GI bleeding.

**Relationship between Peptic Ulcer Complication and Risk Factors**

Chi-square analysis revealed no significant relationship between duration of ulcer and complication of ulcer P > 0.05. Again from the same analysis there was no significant relationship between presence H. pylori infection and ulcer complication P > 0.05. After

adjusting for age, sex, marital status, location and duration disease, peptic ulcer complication absence was likely 0.2 times in gastric patient as compare to non-gastric patients [AOR = 0.2, 95% (0.045 – 0.884)]. The logistic regression

model appropriately explained the outcome variable (peptic ulcer complication) because the Hosmer-Lemeshow goodness-of-fit test *p*-value was more than 0.05, ( $X^2(8) = 11.173, p = .192$ ), hence the model fits the study data (Table 4).

**Table 4:** Logistics Regression of Peptic Ulcer Complication Risk Factors

	B	Wald	Sig.	Exp(B)	H-L GOF test	
					Lower	Upper
					$X^2(8) = 11.173, P = .192$ 95% C.I. for EXP(B)	
Above 40 years		2.606	.456			
10-20 years	-.227	.043	.835	.797	.094	6.770
21-30 years	.774	.587	.443	2.169	.299	15.712
31-40 years	1.219	1.728	.189	3.385	.550	20.856
Male/Female	-1.005	2.298	.130	.366	.100	1.342
Married/single	-.272	.093	.760	.762	.133	4.370
Peri-urban		.257	.880			
Rural	-.212	.068	.794	.809	.164	3.984
Urban	-.377	.250	.617	.686	.157	3.003
Gastric /gastric ulcer	-1.611	4.506	<b>.034</b>	<b>.200</b>	<b>.045</b>	<b>.884</b>
H. pylori (presence/absence)	-1.368	3.370	.066	.255	.059	1.097
Duration (less 12/more 12) month	-.799	1.136	.286	.450	.104	1.954
Constant	6.071	8.562	.003	433.160		

Source: field study, 2020

## 6. DISCUSSION

### Prevalence of H. Pylori among Gastric and Non-Gastric Patient

Out of the 100 study participants 50 were gastric ulcer patients and the remaining 50 were non-gastric ulcer patients. In total 55 (55.0%) of the results of the study participants was positive for Helicobacter pylori infection, indicating a prevalence of 55.0% of Helicobacter pylori infection for the study participants. Also, a study reported a prevalence of 64.39% [7]. The prevalence of H. pylori infection in other parts of Africa ranged between 40% and nearly 90% [9].

The prevalence of Helicobacter pylori in this current study was high (76.0%) among gastric cases and less (34.0%) among non-gastric participants. Meanwhile another study in Africa indicated the prevalence of H. pylori in Africa is high and account for at least 90% of duodenal ulcers and 70% of gastric ulcers [5]. Also, a study in Ghana revealed helicobacter pylori infection to be elevated in patients with upper gastrointestinal symptoms 69.7% (1999) and 45.2% (2012), and was even more elevated in patients with gastritis and duodenal ulcer. H. pylori infection on the other hand, decreased with patients over the period, 69.7% in 1999 to 45.2% in 2012 [10]. Also, in this current study

after adjusting for age, sex, marital status and location, H. pylori infection absence was now likely only 0.12 times in gastric patient as compare to non-gastric patients.

With age, the age group with large (66.7%) proportion of them infected with helicobacter pylori was 10 -20 years and the age group with least (46.7%) infection was 21 – 30 years ( $p = 0.599$ ). With respect to the sex of the participants 60.0% the males were infected ( $p = 0.267$ ). A study has shown no difference of H. Pylori infection rate in both girls and boys ( $p=0.7, \chi^2, 0.15$ ) [9]. This suggests that maintaining all exposures constant, both girls and boys would be infected equally.

Also, in another study sex differences in H. Pylori infection was identified, higher among males than females and elevated among young adults (21-40 years) [10]. Helicobacter pylori is said to be the most common gastrointestinal infection in men world-wide [11].

In terms of location majority (64.0%) of those from urban communities were infected with H. pylori ( $p = 0.518$ ). In Wang, et al., (2019) study marital status was significantly associated with helicobacter infection, 52.9% infections among married participants [12]. And this is not in line with this current study, helicobacter infection was high (59.0%) among participants who were

single as compare to those who were married even though not statistical significant ( $P = 0.463$ ).

The prevalence of NSAIDS use among the peptic ulcer patients was 71.0% and there was no significant difference in terms use among gastric and non-gastric study participants, proportionally 70.0% for gastric and 72.0% for non-gastric. In a study 75% of the H. pylori negative non-gastric ulcer patients, were exposed to non-steroidal anti-inflammatory drugs (NSAIDs) [13]. According to Huang, Sridhar, and Hunt, (2002) helicobacter pylori infection and NSAID use are independent risk factors for the development of peptic ulcer disease and associated bleeding and these conditions are uncommon in those who do not have either risk factor. It has been shown that there is an increased risk when these factors are both present [14]. This further confirmed by Feldman et al., study, that even though the main risk factor for peptic ulcer disease are helicobacter infection and NSAIDS usage, not all patients infected with helicobacter pylori or use NSAIDS develops peptic ulcer disease [15].

About 16.0% of the studied cases recorded complications related to peptic ulcer disease. From the 16 complications experienced by study participants 7 (43.0%) were perforations, 4 (25.0%) were gastric outlet obstruction, 3 (18.8%) were melena stools and finally 2 (12.5%) were upper GI bleeding. The most common complications include bleeding, perforation of the stomach or duodenal walls, and obstruction of the digestive tract [16].

This study analysis did reveal no significant relationship between duration of ulcer and complication of ulcer ( $P > 0.05$ ). Meanwhile from the same analysis there was no significant relationship between presence H. pylori infection and ulcer complication  $P > 0.05$ . However, absence of peptic ulcer complication was likely 0.2 times in gastric patient as compare to non-gastric patients. Gastric ulcers tend to heal more slowly than duodenal ulcers. Comparing gastric ulcer to non-gastric (duodenal), gastric ulcer takes shorter time (two to three weeks to health) and duodenal non-gastric takes six weeks to heal [17].

This study is not without limitation prospective would have been the best design for this type of study but this was limited by time and financial resources.

## **7. CONCLUSION**

The prevalence of H. pylori infection among peptic ulcer patient was more than average and was high among gastric cases. Peptic ulcer complication was less likely among gastric ulcer.

## **8. DATA AVAILABILITY**

All dataset related to the findings of this study is available with the corresponding author.

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