

THE INFLUENCE OF *HELICOBACTER PYLORI* INFECTION ON MALARIA PARASITAEMIA AMONG SYMPTOMATIC PATIENTS IN BUEA, CAMEROON

ABSTRACT

Introduction

Helicobacter Pylori is the main etiological factor for peptic ulcer disease and gastric malignancy. Malaria is one of the world's most prevalent vector-borne disease and the leading cause of illness and death. While infection with either malaria or *H. Pylori* can cause illness and death, infection with one can make infection with the other worse and/or more difficult to treat.

Main Objective

The main objective of the study was to determine the prevalence of malaria and malaria parasitaemia among symptomatic gastritis patients in Buea.

Method

The study was a cross-sectional study carried out from March 2017 to July 2017. The study population comprised of 150 patients who came to the hospital laboratory for *H. pylori* test requested by the physician. Structured questionnaire were used to get demographic and clinical data. 2ml of blood was collected from the patients into an EDTA tube using venipuncture technique. Few drops of blood were used to prepare a thick and thin blood film for malaria parasite determination and the slides were allowed to air dry. The remaining blood in the EDTA tube was then centrifuged at 3000rpm for 5minutes to obtain plasma. The *Helicobacter pylori* test strip was then removed from the pack and two drops of serum were placed on the sample region. The results were read after five minutes.

Results and Discussion

27 The general prevalences of malaria, *Helicobacter pylori* and co-infection were 26.55, 21.9%
28 and 9.9% respectively. There was a significant difference ($p < 0.05$) in the prevalence of *H.*
29 *pylori* among the age groups, gender and educational level.

30 **Keywords:** Malaria, *Helicobacter pylori*, prevalence, co-infection, parasitaemia

31 1. INTRODUCTION

32 *Helicobacter pylori* (*H. pylori*), a spiral-shaped pathogenic bacterium found on the human
33 gastric mucosa, was first isolated by Warren and Marshall in 1982 [1, 2]. The bacterium is a
34 ubiquitous micro-organism, infecting half of the world's population and is widely accepted as
35 the main etiological factor for peptic ulcer disease and gastric malignancy [3]. There has
36 been growing interest in investigating the effects of *H. pylori* in extra-gastro duodenal
37 diseases. Evidence for an association between *H. pylori* and anaemia has gained support from
38 a range of epidemiological studies [4]. Moreover, improvement in iron deficiency anemia
39 (IDA) after *H. pylori* eradication has been demonstrated in children and adults with
40 unexplained IDA [4]. One of the root cause of anaemia is malaria [5].

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42 Malaria, sometimes called the “king of diseases”, is caused by protozoan parasites of the
43 genus *Plasmodium*. It is one of the world’s most prevalent vector-borne disease and the
44 leading cause of illness and death [5,6]. Nine out of ten of these deaths occur in Africa and
45 the rest occurs in Asia and Latin America. Globally, an estimated 3.2 billion people in 95
46 countries and territories are at risk of being infected with malaria and developing the disease,
47 and 1.2 billion are at high risk [7].

48

49 Malaria and *H. pylori* overlap geographically, primarily in Sub-Saharan Africa, Southeast
50 Asia and South America. While infection with either malaria or *H. Pylori* can cause illness
51 and death [6,8], infection with one can make infection with the other worse and/or more
52 difficult to treat.

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54 There is unequivocal evidence that *H. pylori* can be considered as a healthcare issue because
55 of the mortality associated with the infection, due to the risk of ulcer bleeding and gastric
56 cancer [8]. Infection with *H. pylori* results in the development of gastritis in all infected
57 humans, including children and adolescents [9, 10]. Malaria and gastritis remain a major
58 health problem in Africa.

59

60 Studies have shown that some malaria patients usually complain of epigastric pain [11].and
61 this can be misleading as patients might turn to take self-medication for gastritis instead of
62 going for malaria diagnosis and treatment. Information on the prevalence of malaria among
63 patients presenting with signs and symptoms of gastritis in Cameroon and globally is limited.
64 Thus, this research was designed to find out the prevalence of malaria and *H. pylori* among
65 patients presenting with signs and symptoms of gastritis.

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67 **2. MATERIALS AND METHODS**

68 **2.1 Study Area**

69 The study was carried out at the Buea Regional Hospital. Buea is the Regional Headquarter
70 of South West Region. The Buea Regional Hospital is the main referral hospital in Fako
71 Division, South West Region of Cameroon. Patients presenting in this hospital come from all
72 over the Fako Division. Buea is situated at the foot of Mount Cameroon. The climate of
73 Buea is of equatorial type with temperatures that ranges from 25-29°C annually. There are
74 two main seasons; the rainy season and the dry season. Malaria is endemic in this region
75 and transmission occurs all year round with an average of 1-80 malaria cases per thousand
76 per year [7]. Generally, the volcanic activities of the mountain has rendered the topography
77 of the entire region very rugged. Buea has a cool moist equatorial type climate.

78 **2.2 Study Population, duration and design**

79 It was a cross-sectional study carried out from March 2017 to July 2017. The study
80 population comprised of all patients who came to the hospital laboratory for *H. pylori* test
81 requested by the physician.

82 **2.3 Sample population, sampling technique and data collection**

83 A total of 150 people were included in the study. Only patients that came for *H. pylori* test
84 in the laboratory were accepted. Participants in the study were recruited and interviewed
85 using a well-structured questionnaire and blood samples were collected for analysis.

86 A structured questionnaire was used to collect demographic and clinical data.

87 Each patients was invited for a talk on the aims and significance of the study after which an
88 informed consent form was presented. Patients who consented to the study were then served
89 questionnaires to help generated relevant demographic and clinical data.

3.4 Sample Collection and Test Procedure

2ml of blood was collected from the patients into an EDTA tube using venipuncture technique. Few drops of blood was used to prepare a thick and thin blood film for malaria parasitaemia and the slides were allowed to air dry. The remaining blood in the EDTA tube was then centrifuged at 3000rpm for 5minutes to obtain plasma. The *Helicobacter pylori* test (Onsite Rapid Test, CTK Biotech) strip was then removed from the pack and two drops of serum were placed on the sample region and the results were read after five minutes. Where the test line and the control lines appeared, the test was recorded as positive, but where just the control line appeared, the test was recorded as negative. The malaria slide was stained using Giemsa and observed using the oil immersion objective (X100), at least 10 fields were observed and the malaria parasites counted against 200 WBC and expressed as parasites per microlitre of blood, assuming a WBC count of 8000 in one microlitre of blood [6].

3.5 Ethical and Administrative Consideration

Administrative and Ethical clearances were obtained from the Regional Delegation of Public Health in Buea and from the Director of the Buea Regional Hospital.

3.6 Data Analysis

All data were first recorded in a log book, then entered into excel and later exported to SPSS version 20.0 for analysis.

3. RESULTS

3.1 Distribution of Study Participants

For the study, 150 participants were recruited for the study and all (100%) gave their consent to participate in the study. From the study population, 69 (46%) were males while 81 (54%) were females. 86 (57.3%) of the participants were single, 46 (30.7%) were married, 10 (6.7%) were divorced and 8 (5.3%) were widowed. 2 (1.3%) had no formal education, while 148 (98.7%) had some degree of formal education. Majority of the participants (39.3%) were in the age group 21-30 years as seen on table 1.

Table 1: Characteristics of the study population

Variables		Number enrolled	Percentage (%)
Age (years)	≤ 10	8	5.3

Mean age 28.33	11-20	28	18.5
	21-30	59	39.1
	31-40	30	19.9
	>40	25	16.6
Gender	Male	69	46.0
	Female	81	54.0

3.2 General prevalence of Malaria, *H. pylori* and Co-infection among patients presenting with gastritis.

From the study, 40 persons were positive for malaria giving an overall prevalence of 26.5% while 33 (21.9%) were positive for *H. pylori*. On the other hand, 15 persons were positive for malaria and *H. pylori* giving the prevalence of co-infection of 9.9% as seen in figure 1.

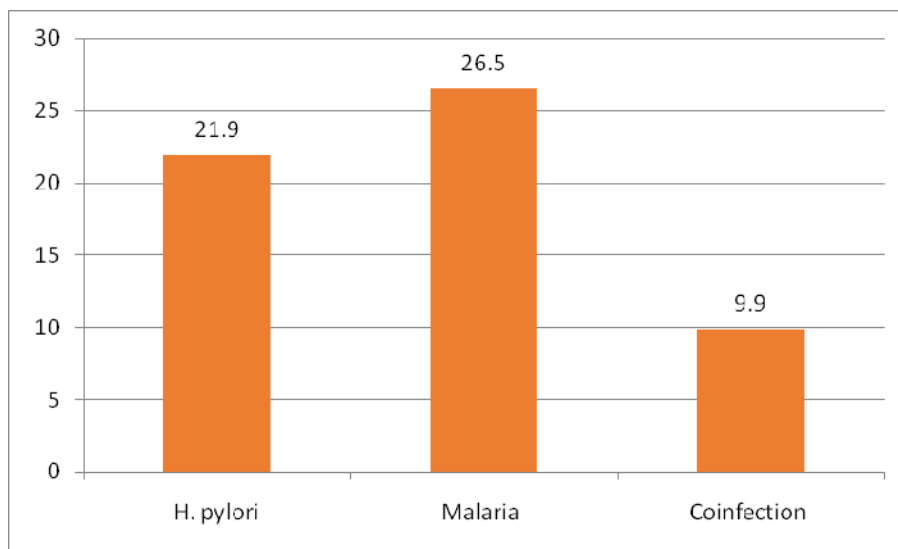


Figure 1: Overall prevalence of malaria, *H. pylori* and co-infection

3.3 Prevalence of Malaria, *H. pylori* and co-infection with respect to Age group

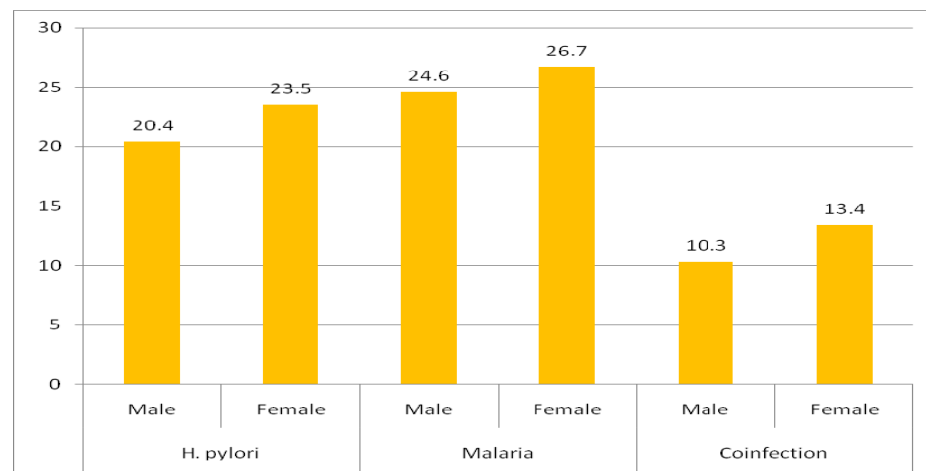
There was significant difference in the prevalence of *H. Pylori* among different age groups with the highest prevalence in the age group >40 (12, 46.2%) and the lowest in the age group of ≤ 10 (1, 12.7%). There was no significant difference in malaria prevalence based on age groups. The prevalence of *H. pylori* and malaria co-infection was significantly highest in the elderly than in the younger population as shown in table 2.

Table 2: Prevalence of Malaria, H. pylori and co-infection with respect to Age group

Age(years)	Number enrolled	Positive for H. pylori (%)	P-Value	Positive for malaria (%)	P-Value	Co-infection	P-Value
≤ 10	8	1(12.7)	0.011	3(37.5)	0.648	0(00)	0.037
11-20	28	4(14.3)		10(35.7)		2(10.0)	
21-30	59	8(13.6)		13(22.0)		5(9.8)	
31-40	30	8(26.7)		7(23.3)		2(8.0)	
>40	25	12(46.2)		7(26.9)		6(24.0)	

3.4 Prevalence of malaria, H. pylori and co-infection with respect to sex.

According to the study, the prevalence of *H. pylori*, malaria and co-infection was higher among women than males. However, chi square test showed no statistical significant difference between the variables, as seen on figure 2.



P-Value= 0.641

P-Value= 0.604

P-Value=0.596

Figure 2: Sex distribution of prevalence of Malaria, H. pylori and co-infection

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142 **3.5 Prevalence of Malaria, *H. pylori* and co-infection with respect to level of income**

143 From the study, *H. pylori*, malaria and co-infection was higher among participants with
 144 income level <25000 FRS. It was observed that there is statistical significance among
 145 participants positive for malaria (P= 0.001) *H. pylori* (P=0.000) and co-infection (P= 0.000)
 146 in relation to income (Table 3).

147 **Table 3: Prevalence of Malaria, *H. pylori* and co-infection with respect to level of income**

Level of income	Number enrolled	Positive for <i>H. pylori</i> (%)	P-Value	Positive for malaria (%)	P-Value	Co-infection	P-Value
No income (unemployed)	23	35 (13.7)	0.000	11(47.8)	0.001	2 (14.3)	0.000
<25000	34	18 (54.5)		16 (47.1)		12(40.0)	
25000- 50 000	36	5 (13.9)		7(19.4)		0(00)	
50 001- 75 000	30	3 (10.0)		4(13.3)		1(3.7)	
75 001- 100 000	14	3 (21.4)		2(14.3)		0(00)	
>100 000	13	1 (7.7)		0(00)		0(00)	

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3.6 Prevalence of Malaria, *H. pylori* and co-infection with respect to level of education

According to the study, *H. pylori* infection was higher among participants with at least a high school level of education (22, 29%). Malaria was higher among participants with primary education (7, 38.9%) and co-infection was observed among those with vocational level of education 3 (16.7%). However, chi square test showed no significant difference between the variables, (Table 4).

Table 4: Prevalence of Malaria, *H. pylori* and co-infection with respect to level of education

Level of Education	Number enrolled	Positive for <i>H. pylori</i> (%)	P-Value	Positive for malaria (%)	P-Value	Co-infection	P-Value
No formal education	2	0(00)	0.256	0 (00)	0.666	0(00)	0.803
Primary	18	2(11.1)		7(38.9)		1(8.3)	
Secondary	34	5(14.7)		8(23.5)		2(7.1)	
High school	75	22(29.0)		19(25.3)		9(13.8)	
Vocational	21	4(22)		6(28.6)		3(16.7)	

3.7 Prevalence of Malaria, *H. pylori* and co-infection with respect to marital status

From the study, the prevalence of *H. pylori*, malaria and co-infection was high among widows 62.5%, 37.5%, and 28.6% respectively. However, Chi square test showed no statistical significant difference between the various variables, (Table 5).

Table 5: Prevalence of Malaria, *H. pylori* and co-infection with respect to marital status

Marital status	Number enrolled	Positive for <i>H. pylori</i>	P-Value	Positive for malaria	P-Value	Co-infection (%)	P-Value
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		(%)		(%)			
Single	86	14 (16.3)	0.011	23 (26.7)	0.870	7(10.0)	0.548
Married	46	10 (21.7)		12(26.1)		5(12.8)	
Divorced	10	4 (40.0)		2(20)		1(11.1)	
Widow/Widower	8	5 (62.5)		3(37.5)		2(28.6)	

3.8 Prevalence of *H. pylori* with respect to parasite density

From the study, *H. pylori* infection was higher among patients with low malaria parasite density 6 (40.0%) than among those with high malaria parasite density as seen on table 6.

Table 6: Prevalence of *H. pylori* with respect to malaria parasite density

Parasite Density	Number enrolled	Positive for <i>H. pylori</i>	P-Value	Prevalence (%)
Low	15	6	0.811	40.0
Moderate	8	3		37.5
High	17	5		29.4

4. DISCUSSION,

Based on the study, the general prevalence of malaria, *Helicobacter pylori* and co-infection of both diseases among patients presenting with gastritis was 26.5%, 21.9% and 9.9% respectively. The prevalence of *H. pylori* in this study was lower than that of Mabeku *et al.* (2018) [13] who had a prevalence of 64.39% among patients in Douala, Littoral Region of Cameroon. It is also lower than that of a study carried out by Ankouane *et al.* (2015) [14] in Yaoundé who had a prevalence of 88.1%. This difference in prevalence is probably due to greater sensitization on health issues, risk and prevention over the past few years. Considering that Buea is principally an academic town and host students from different areas and countries, there is probably more sensitization on disease prevention.

Following the study, *H. pylori* were more prevalent among patient's >40 years of age, this could be due to the fact that they are advanced in age and their immune system is weakened. Also elderly people have had more time to be exposed to the bacterium. Considering that infections with *H. pylori* are often asymptomatic, patients can carry infections for years before the appearance of clinical signs and symptoms. On the other hand, malaria was more prevalent among patients below the age of 10years. This could also be due to the fact that their immune system is still developing and also that young children play outside and are exposed to mosquito bites which makes them prone to malaria infection.

According to the study, females had higher prevalence for malaria and *H. pylori* than their male counterparts. This could be due to the fact that women do more work that concern the environment and soil than men, like farm work and so may be more exposed to *Helicobacter pylori* bacterium.

Following the study, based on marital status it was observed that participants who have lost their spouses had a high prevalence of *H. pylori* infection and malaria. This could be related to the fact that the loss of a spouse leads to a drop in family income and as such hygienic conditions and preventive methods could be compromised by poverty.

Based on the study, *H. pylori* infection was more prevalent among patients with low malaria parasitaemia than those with high parasitaemia. This could be due to the fact that the presence of *H. pylori* in the body could stimulate the immune system to resist other pathogens thereby hindering their multiplication.

5. CONCLUSION

The general prevalence of malaria among asymptomatic gastritis patients was 26.5%. The general prevalence of *Helicobacter pylori* infection among asymptomatic gastritis patients was 21.9%. Co-infection with malaria and *H. pylori* was found to be 9.9%. *Helicobacter* infection was higher among patients with low malaria parasitaemia than patients with high parasite load. Improved environmental and household hygiene can help to reduce the transmission of malaria parasite and bacterial infection such as *H. pylori*.

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