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Research Article

Prevalence of *H. pylori* in Type 2 Diabetes Patients Attending the Nkwen District Hospital, Bamenda – Cameroon

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Abstract

Background: *Helicobacter pylori* is a bacterium suspected to be associated with extra-digestive diseases including diabetes. However, there is limited evidence on the burden and determinants of this bacterial infection within the North West Region of Cameroon. We aimed at investigating the prevalence and risk factors of *H. pylori* in type 2 diabetes patients attending the Diabetes Clinic of the Nkwen District Hospital, Bamenda – Cameroon.

Methodology: This was a hospital-based case-control and cross-sectional study involving 70 type 2 diabetes patients and 100 non-diabetic controls. Following informed consent, serological testing for *H. pylori* antibody was performed using *H. pylori* antibody rapid test kit. *H. pylori* data regarding prevalence and risk factors were analyzed using Statistical Package for Social Science (SPSS) version 22.0; with *p*-value < 0.05 considered statistically significant.

Results: The overall prevalence of *H. pylori* was 64%; with a non-significant disparity according to diabetes: 70% (49/70) in diabetic patients versus 60% (60/100) in non-diabetic controls (p = 0.181). Interestingly, diabetic patients who ate only at home had a significantly lower prevalence of *H. pylori* (62.9%) compared to those who ate both at home and restaurants (93.8%) (p = 0.018). All other potential factors tested in both groups were not statistically associated with the risk of having *H. pylori (p* > 0.05).

Conclusion: The prevalence of *H. pylori* in the general population of the Health District of Nkwen is high regardless of diabetic status. However, type 2 diabetes patients frequenting restaurants stand at a higher risk of carrying *H. pylori*; suggesting the need for adherence to infection prevention and control measures within community restaurants.

Keywords: Prevalence; *H. pylori*; Risk Factors; Bamenda

Introduction

Helicobacter pylori probably represents one of the latest infectious bacteria isolated from humans. The earliest description of spiral bacteria dates back to 1893 in the stomachs of dogs. Thirteen years later, the same findings were discovered in human stomachs. Several reasons may explain the delay in identifying and characterizing this microorganism. Bacteriologists and physicians assumed the high acidity present in the stomach did not provide the ideal condition for microbial colonization, but it turned out that the human stomach provided the ideal niche for *H. pylori* [1]. The significance of this organism was alternately debated and

forgotten until Marshall and Warren isolated a Gram-negative, microaerophilic bacterium from human gastric biopsies and proposed that the organism may be the cause of chronic gastritis and peptic ulcer disease. The bacterium was thought originally to be a member of the genus Campylobacter and named *"Campylobacter pyloridis"*, but later corrected to "*Campylobacter pylori*". Subsequent 16SrRNA sequence analysis showed that the distance between the true campylobacters and *C. pylori* was sufficient to exclude it from the Campylobacter genus, thus; it was reclassified to *Helicobacter pylori* [2]. It is mostly found in the pyloric region of the stomach and causes chronic gastric infection. It is estimated that this bacterium infects more than half of the world's population. The actual mode of transmission and infection of *H. pylori* is unknown, but the faecal–oral and oral–oral routes via water or food consumption are thought to be a very common cause [3]. *Helicobacter pylori* infection is now known to be the principal cause of chronic gastritis, gastric ulcer, duodenal ulcer, gastric adenocarcinoma and gastric mucosa-associated lymphoid tissue lymphoma. In recent years, many articles have published on the fascinating topic of extra gastroduodenal manifestations of *H. pylori* infection, including hematological, metabolic, cardiovascular, neurodegenerative and allergic disorders [4]. *H. pylori* was reported more prevalent in type 2 diabetic patients than healthy individuals and thought to be due to *H. pylori* infection-induced inflammation and production of inflammatory cytokines, as well as hormonal imbalance caused by this bacterium associated with Diabetes mellitus [5]. *H. pylori* persists in water and in some studies, untreated municipal water was considered the main cause of increased *H. pylori* infection [7]. Poor socioeconomic status, improper hygiene practices, and overcrowding living conditions have also been implicated as risk factors for getting *H. pylori* infection [8]. *H. pylori* infection was significantly higher in persons with a lower frequency of hand washing and well water consumption [9]. We aimed at investigating the prevalence of *H. pylori* in type 2 diabetes patients attending the Nkwen District Hospital, Bamenda -Cameroon and to identify possible risk factors associated with the infection in this locality.

Materials and Methods

Type and duration of the study

This was a hospital-based, case-control and cross-sectional study that was carried out between April and June, 2023.

Study site and participants

Study participants were type 2 diabetes patients receiving care at the Diabetic Clinic of the Nkwen District Hospital – Bamenda, the North West Region of Cameroon. Non-diabetic controls included hospital staff, students on internship, patient care-givers, and healthy individuals visiting this hospital for reasons other than health issues. Screening of blood sugar levels (Fasting Blood glucose) using a glucose meter was used to confirm the non-diabetic status of control subjects prior to enrollment into the study.

Sample collection and processing

Venous blood was collected in an EDTA tube from all participants. The tubes were labeled with each participant's code. The samples were centrifuged at a speed of 1500 revolution per minute for 5minutes. 50 microliter of plasma was gotten using a pipette and dropped on the sample window of the *H. pylori* One Step Test Device (Swe-Care Rapid Diagnostic Test, for invitro diagnosis of *H. pylori* antibodies). Results were read after 15minutes. The presence of two lines appearing at the result window signified a positive result for *H. pylori* antibodies, while a single line at the control section signified a negative result. The result was invalid if only the test line appeared without the control line or both absent. A questionnaire was administered to collect sociodemographic data and data regarding risk factors. Assay parameters were analyzed using a software application SPSS. The Chi-square test was applied to verify for differences between categorical variables, and a *p*-value of < 0.05 was considered statistically significant.

Ethical consideration

Ethical clearance according to the Declaration of Helsinki was sought from the Institutional Review Board of the Faculty of Health Sciences, University of Bamenda. Free and informed consent was obtained from each participant before inclusion in the study. The right to refuse or withdraw from the study was fully maintained. An authorization was issued by the Director of Regional Hospital Bamenda to analyze samples in their laboratory.

Results

Socio-demographic characteristic of study participants.

Of the 70 diabetic patients, 49 (70%) were females and 21(30%) males; and of the 100 non-diabetic controls, 45 (45%) were males and 55 (55%) females. More participants were within the age group 50-70 years for both cohorts. Less than 30% of patients or controls had no formal education (Table 1).

		Non-diabetic		Diabetic	
Variable	**Characteristics**	**Frequency**	**Percentage (%)**	**Frequency**	**Percentage (%)**
Sex					
	Male	45	45	21	30
	Female	55	55	49	70
Total		100	100	70	100
Age range					
	25-30	1	1	0	0
	31-40	7	7	0	0
	41-50	12	12	10	14.3
	51-60	28	28	37	52.9
	61-70	33	33	20	28.6
	71-80	16	16	0	0
	81-90	3	3	3	4.3
Total		100	100	70	100
Level of Education					
	No school	29	29	14	20
	Primary	24	24	37	52.9
	Secondary	36	36	13	18.6
	university			6	8.6

Table 1: Socio-demographic characteristic of participants.

Prevalence of *H. pylori* in diabetic patients versus controls

The Prevalence of *H. pylori* in diabetic patients was 70.0% as compared to 60.0% in the control group ($p > 0.05$) (Table 2).

Results		**Frequency**	**Percentage (%)**	**Chi-square**	***p*-value**
Diabetic patients	Positive	49	70	0.074	0.785
	Negative	21	30		
	Total	70	100		
Non-diabetic controls	Positive	60	60		
	Negative	40	40		
	Total	100	100		

Table 2: Prevalence of *H. pylori* in diabetic patients versus controls.

Prevalence of *H pylori* in diabetic patients according to socio-demographic factors

The Prevalence of *H. pylori* was higher in males (66.7%) compared to females (54.5%); but this difference was not statistically significant ($p > 0.05$). The prevalence of *H. pylori* did not differ according to age or level of education ($p > 0.05$) (Table 3).

Variable	Characteristics	Frequency	Positive (%)	Negative (%)	Chi-square (x^2)	*p-value*
Sex						
	Male	45	30 (66.7)	15 (33.3)	0.936	0.333
	Female	55	30 (54.5)	25 (45.5)		
Age range						
	41-50	10	9 (90.0)	1(10.0)		
	51-60	37	22 (59.5)	15 (40.5)		
	61-70	20	16 (80.0)	4 (20.0)	4.831	0.185
	71-80	0	0 (0.0)	0 (0.0)		
	81-90	6	5 (83.3)	1 (16.7)		
Level of Education						
	No school	14	9 (64.3)	5 (35.7)		
	Primary	37	24 (64.9)	13(35.1)	2.513	0.473
	Secondary	13	11 (84.6)	2 (15.4)		
	University	6	5 (83.3)	1 (16.7)		
Total		70	49	21		

Table 3: Prevalence of *H. pylori* in diabetic patients according to socio-demographic characteristics.

Prevalence of *H. pylori* according to risk factors in patients and controls

Diabetic patients who ate only at home had a lower prevalence of *H. pylori* (62.9%) compared to those who ate both at home and at restaurants (93.8%) (p = 0.018). Results were not significant in both cohorts for all the other risk factors tested (p > 0.05) (Table 4).

		Non diabetics (n = 100)				Diabetic (n = 70)				
Risk factors	Frequency	Positive (%)	Negative (%)	x^2	*p- value*	Frequency	Positive (%)	Negative (%)	x^2	*p- value*
1. Eating Site										
Restaurant only	1	1(100.0)	0(0.0)			0	0(0.0)	0(0.0)		
Home only	76	44(57.9)	32(42.1)	1.07	0.586	54	34(62.9)	20(37.1)	5.57	0.018
Both	23	15(65.2)	8(34.8)			16	15(93.8)	1(6.2)		
2. Availability of a Toilet										
Yes	100	60(60.0)	40(40.0)	NA	NA	70	49(70.0)	21(30.0)	NA	NA
No	0	0(0.0)	0(0.0)			0	0(0.0)	0(0.0)		
3. Hand washing after using the Toilet										
Always	99	59(59.6)	40(40.4)	0.67	0.412	70	49(70.0)	21(30.0)	NA	NA

Often	1	1(100.0)	0(0.0)			0	0(0.0)	0(0.0)		
4. Been to a Camp										
Yes	42	26(61.9)	16(38.1)	0.11	0.741	0	0(0.0)	0(0.0)	NA	NA
No	58	34(58.6)	24(41.7)			70	49(70.0)	21(30.0)		
Family History of Gastritis/ Duration										
Don't Know	77	47(61.0)	30(39.0)			29	16(55.2)	13(44.8)		
1 year	7	4(57.1)	3(42.9)			24	19(79.2)	5(20.8)	5.3	0.151
2 years	6	3(50.0)	3(50.0)			0	0	0		
3 years	2	1(50.0)	1(50.0)	0.03	0.341	10	8(80.0)	2(20.0)		
4 years	3	3(100.0)	0(0.0)			0	0	0		
5 years	2	1(50.0)	1(50.0)			0	0	0		
> 5 years	3	1(33.3)	2(66.7)			7	6(85.7)	1(14.3)		
5. Source of portable water?										
Tap	79	49(62.0)	30(38.0)	1.8	0.18	64	44(68.8)	20(31.2)		
Stream	12	7(58.3)	5(41.7)			3	3(100.0)	0(0.0)	1.35	0.509
Both	0	0	0			3	2(66.7)	1(33.3)		

Table 4: Prevalence of *H. pylori* according to risk factors in patients and controls.

NA = not applicable.

Discussion

Helicobacter pylori is one of the commonest infectious pathogens with a high recurrence rate. The prevalence of *H. pylori* has declined in industrialized countries of the western world while the prevalence keeps increasing at in developing and newly industrialized countries [10]. This study was undertaken to determine the occurrence of *H. pylori* in diabetic patients versus non-diabetic controls attending the Nkwen District Hospital. A total of 170 persons participated (70 diabetic patients and 100 non-diabetic control). In this study, the overall prevalence of *H. pylori* was 70% in diabetics versus 60% in non-diabetic controls; comparable to data (73.11% in type 2 diabetic patients versus 58.05% in non-diabetic controls) obtained by L. B. Kouitcheu Mabek of a similar study in Douala [11]. In another study carried out in Saudi Arabia involving 212 type 2 diabetic patients aged 40 years or more, and 209 age-matched non-diabetic subjects, about one-quarter of the diabetics and non-diabetics were positive for *H. pylori* (26.9% and 26.3%, respectively) [12], quite less than the prevalence records from our study. We attribute this broad difference in prevalence to differences in the diagnostic methods used for *H. pylori*. Serological tests as applied in our study may indicate previous exposure to, or a current infection with *H. pylori*, while the *H. pylori* stool antigen used by the study in Saudi Arabia only detect specific antigens that are shed during active-infections and will have less cross-reactivity than the serological approach detecting antibodies. We therefore advise that Serological methods for the diagnosis of *H. pylori* should be applied at clinical settings with intense caution, and the interpretation of results done alongside clinical information available to the physician. Notwithstanding, the overall outcome of our study of a non-significant difference in the prevalence of *H. pylori* in patients versus controls, coincides with those of other studies [11,12]. Type 2 *Diabetes mellitus* may therefore not be a significant risk factor to *H. pylori* infection, or *H. pylori* infection a risk factor to type 2 diabetes in our setting.

The prevalence of *Helicobacter pylori* in males was higher than that in female 66.7 and 54.3 respectively but this was not statistically significant with a p-value of 0.333. This is in conformity with a similar research done in Yaounde by Ebule., *et al*. in 2017 [13].

Diabetes patients who ate both at Home and Restaurants had a higher prevalence of *H. pylori* compared to those who strictly had their meals only at home. This was not the case with the non-diabetic healthy control cohort. As poor hygiene is closely connected with *H. pylori* infection, we speculate that outdoor eating could be less hygienic, rendering the possible immune-compromised Diabetes patients more susceptible to *H. pylori* infection.

Limitations

This research was done using the serological method of diagnosis for *H. pylori* which is less specific.

Conclusion

Our study supports those of others that type 2 diabetes is not a risk factor to *H. pylori* infection, or vice versa. However, eating at restaurants by diabetic patients may exacerbates the occurrence of the infection in these persons. Diabetic patients are thought to have a weakened immune system compared to healthy individuals and thus, hygiene rules should be more carefully observed when preparing their meals. We advise for a more extensive study of higher power, with a more specific diagnostic approach, to confirm the absence of an association between *H. pylori* infection and type *2* Diabetes mellitus.

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