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Research Article

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Practices of Gastroenterologists in Cameroon on the Management of *Helicobacter Pylori* Infection

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Abstract

Background: *In Africa and Cameroon in particular, there is no consensus guideline for diagnosis and treatment of Helicobacter pylori infection (HPI). The aim of this study was to describe the current practices on management of H. pylori infection among gastroenterologists in Cameroon and compare with existing guidelines.*

Methods: *This was an observational and descriptive study from October 1st 2020- July 31st 2021. All consenting gastroenterologist practicing in Cameroon were consecutively included. Data collected included socio-demographic and clinical data (pre-eradication diagnostic tests, treatment schemes and drug regimens, post-eradication control test). Data obtained was analyzed using IBM-SPSS version 26.0.*

Results: *Fifty participants were approached among which 40 responded giving a response rate of 80%. The mean age of participants was 47.8 ±10.8 years with a male predominance with a sex ratio of 1.85. The median number of years of practice as a gastroenterologist was 9 years (IQR 5.0-18.8). The main pre-eradication diagnostic tests were histology (82.5 %). The main treatment protocols used as first line for eradication were: non-bismuth concomitant quadruple therapy for 28 participants (70.0%). Thirteen participants (32.5%) routinely requested for eradication control. The main post-eradication control test used included: urea breathe test; 22 participants (55.0%), histology; 13 participants (32.5%).*

Conclusion: *In Cameroon most gastroenterologists had practices like those recommended in the developed world on the management of HPI with some degree of variability. This variability in practices observed highlights the need for local guidelines based on empirical evidence of treatment efficacy, available diagnostic test, and cost-efficiency.*

Keywords: *Helicobacter Pylori,* Management, Practices, Gastroenterologist, Cameroon

1. Background

Helicobacter pylori (H. pylori) infection has been reported to be implicated in the pathogenesis of some gastrointestinal diseases, such as gastritis, non-ulcer dyspepsia, peptic ulcer diseases, and gastric cancer [1]. It affects about 50% of the world's population with an estimated prevalence of 72.5% in Cameroon [2,3]. While it can be diagnosed by both invasive and non-invasive tests, eradication of this infection facilitates peptic ulcer healing, reduces ulcer relapse rates, and prevents gastric cancer. Management of *H. pylori* infection requires accurate and specific diagnosis and follows a three step process; diagnosis, treatment and confirmation of cure [4]. Several guidelines and recommendations have recently been developed in Europe and the USA for the appropriate management of *H. pylori* infection due to its high prevalence on one hand and progression of antibiotic resistance on the other hand [5-7]. In Africa, there is no consensus guideline for diagnosis and treatment of Helicobacter pylori infection (HPI) [8]. Several reports from the continent have used existing diagnostic methods and treatment regimens for HPI in a setting dominated by inadequate health-care systems coupled with an increasing number of treatment failures due to antibiotic resistance and different antibiotic susceptibility patterns for H. pylori. This highlights the need to harmonize protocols based on local realities. In Cameroon, management of this infection is mainly done by gastroenterologists and no consensus exists as well. The aim of this study was to describe the current practices on diagnosis, treatment and follow up of patients with *H. pylori* infection among practicing gastroenterologists in Cameroon and compare these practices with existing guidelines and recommendations.

2. Materials and Methods

2.1. Study Design and Setting

This was an observational and descriptive study from October 1st 2020- July 31st 2021. All consenting gastroenterologist practicing in Cameroon and following up patients with *H. pylori* infection were conveniently included. The updated list of all practicing gastroenterologist and their corresponding hospitals was obtained from the secretariat of the Cameroon Society of Gastroenterology and each respondent was met in their respective units. Those who could not be met physically were contacted by mail. Data collected included socio-demographic (age, gender, hospital of practice, number of years of practice as gastroenterologist, university status, town of practice, participation in continuous medical education), clinical data (pre-eradication diagnostic tests, number of biopsies and biopsy sites, treatment schemes and drug regimens, treatment duration, post-eradication control test, procedure in case of treatment failure). Based on existing guidelines we considered recommended practices on diagnosis, treatment and follow–up as follow; recommended practices on *H. pylori* infection diagnosis; use of either urea breath test, rapid urea test, histology or stool antigen test as a pre-eradication diagnostic test with 5 biopsies taken for its detection recommended practices on *H. pylori* infection eradication; use of either bismuth or non-bismuth concomitant quadruple therapy for either 10 or 14 days. recommended practices on *H. pylori* infection eradication control; use of urea breath test, stool antigen test or histology as post–eradication control test, 4 weeks after completion of eradication therapy.

2.2. Data Analysis

Data obtained were entered using CSpro (Census and Survey Processing system) version 7.1 and analyzed using IBM-SPSS (International Business Machine- Statistical Package for Social Sciences) version 26.0. Quantitative variables were presented as mean ± standard deviation (SD) and medians with corresponding interquartile ranges where applicable, while categorical variables were presented using frequencies and percentages.

2.3. Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé 1. All respondents were required to personally sign an informed consent form before any specific activities were undertaken. A written and verbal version of the participant's information sheet and informed consent were presented to the participants either physically or by mail detailing the exact nature of the study; what it involved; the implications and constraints; any risk(s) involved in taking part. It was also clearly stated that the participant was free to withdraw from the study at any time for any reason without prejudice, and with no obligation to give the reason for withdrawal.

3. Results

Fifty participants were approached physically and by mail among which 40 responded giving a response rate of 80%. The mean age of participants was 47.8±10.8 years, with a male predominance, 26 participants (65.0%). The median number of years of practice as a gastroenterologist was 9 IQR (5.0-18.8). One quarter of participants (10) were university teachers and 38 participants (95.0%) reported to participate in continuous medical education. Twenty participants (50.0%) practice in public hospitals, 14 (35.0%) in private hospitals while 6(15.0%) practice in both private and public hospitals (Table 1).

Characteristic	Absolute frequency (n=40)	Relative frequency (%)
Median number of years of practice as gastroenterologist	9 IQR (5.0-18.8)	
Gender		
Male	26	65.0
Female	14	35.0
University status		
Yes	10	25.0
No	30	75.0
Participation in continuous medical education		
Yes	38	95.0
No	02	5.0
Hospital of practice		
Private	14	35.0
Public	20	50.0
Both	06	15.0

Table 1: Socio-Demographic Characteristics of Participants

Pre-eradication diagnostic tests used included histology;33 participants (82.5 %), rapid urea test; 28 participants (70.0%), stool antigen test; 10 participants (25.0%), urea breath test; 7 participants (17.5%), serology; 5 participants (12.5%), and bacterial culture;1 (2.5%) (Table 2). Each participant could use one or more tests for diagnosis. On the other hand, post-eradication control test used included: urea breathe test; 22 participants (55.0%), histology; 13 participants (32.5%), stool antigen test ;10 participants (25.0%) rapid urea test; 6 participants (15.0%) and serology; 3 participants (7.5%) (Table 2)

Diagnostic test	Pre-eradication (%)	Post-eradication (%)
Urea breath test (UBT)	07 (17.5)	22 (55)
Rapid urease test (RUT)	28 (70)	6 (15)
Bacterial culture	01 (2.5)	13 (32.5)
Histology	33 (82.5)	0 (0)
Stool antigen test	10 (25)	10 (25)
Serology	05 (12.5)	3 (7.5)

Table 2: Pre-Eradication Diagnostic Tests and Post-Eradication Control Tests used by Participants (n= 40)

With regards to the diagnostic procedure proper, eight participants (20.0%) performed between 1-2 biopsies for *H. pylori* infection detection while 16 participants (40.0%) performed between 3-4 biopsies and 16 other participants (40.0%) performed at least 5 biopsies for *H. pylori* infection testing. All respondents performed biopsies in the antrum while 26 (65.0%) respondents performed biopsies in the incisura angularis, 30 participants (75.0%) in the corpus and 1 participant (2.5%) in the duodenum (Table 3). Considering eradication control, only thirteen participants (32.50%) routinely requested for eradication control in all patients, 25 participants (62.5%) requested for eradication control in special cases such ulcers, metaplasia, dysplasia (Table 3). Eighteen respondents (45.0%) requested for eradication control at 4 weeks post–completion of treatment, 12 (30.0%) respondents between 4-8 weeks post-completion of treatment, 6 (15.0%) at 8 weeks post-completion of treatment (Table 3).

Variable	Absolute frequency (n)	Relative frequence (%)
Number of biopsies		
[1-3[	08	20
[3-5[	16	40
≥ 5	16	40
Biopsy site		
Antrum	40	100
Incisura angularis	26	65
Corpus	30	75
Others (duodenum)	01	2.5
Systematic eradication control		
Yes	13	32.5
No	27	67.5
Post-eradication control period		
4 weeks	18	45
4-8 weeks	12	30
8 weeks	06	15
Others	04	10
Indications for eradication control		
All patients	13	32.5
Special cases (ulcers, metaplasia, dysplasia)	25	62.5
Never	02	5

Table 3: Diagnostic and Post-Eradication Procedures (N=40)

The first line treatment protocols used were; non-bismuth concomitant quadruple therapy (PPI+ Amoxicillin+ Clarithromycin+ metronidazole) by 28 participants (70.0%), sequential triple therapy (PPI +Amoxicillin then PPI +Clarithromycin +metronidazole) by 8 participants (20.0%), concomitant triple therapy (PPI+ Amoxicillin +Clarithromycin) 3 participants (7.5%) and bismuth concomitant quadruple therapy (PPI + Bismuth salt + Tetracycline + metronidazole) 1 participant (2.5%) (Table 4).

Treatment schemes	Drug regimens	Numbers	Frequency (%)
Sequential triple therapy	PPI + Amoxicillin then PPI + Clarithromycin + Metronidazole	08	20
Concomittant triple therapy	PPI + Amoxicillin + Clarithromycin	03	7.5
Concomittant bismuth quadruple therapy	PPI + Tetracycline + Bismuth + Metronidazole	01	2.5
Non bismuth concomittant quadruple therapy	PPI + Amoxicillin + Clarithromycin + Metronidazole	28	70

Table 4: First Line Treatment Schemes and Corresponding Drug Regimens Used By Participants (N= 40).

Treatment duration varied between 10 days (sequential and bismuth quadruple therapy) and 14 days (non-bismuth concomitant quadruple therapy). In the case of established eradication failure 28 participants (70.0%) prescribed alternative drug regimens, 4 participants (10.0%) collected samples for bacterial culture, 3 participants (7.5%) prescribed alternative drug regimens and if failure samples for bacterial culture, 3 other respondents (7.5%) prescribed PPI in the presence of symptoms, 1 participant prolonged the duration of the previous regimen while 1 other participant did nothing (Table 5).

Procedure in case of treatment failure	Absolute frequency (n= 40)	Relative frequency (%)
sample for bacterial culture	04	10.0
alternative drug regimens	28	70.0
alternative drug regimen if failure then bacteria culture	03	7.5
prolong duration of previous regimen	01	2.5
PPI in the presence of symptoms	03	7.5
Nothing	01	2.5

Table 5: Attitude Adopted in Case of Treatment Failure

4. Discussion

This study sought to describe the current practices on diagnosis, treatment and follow–up of patients treated for *H. pylori* infection among gastroenterologist in Cameroon. The mean age of our study population was 47.8 ± 10.8. The median number of years of practice as gastroenterologist was 9 years IQR (5.0-18.8) with a minimum of 2 years and a maximum of 47 years. This wide range in the number of years of practice shows that there exist a younger and older generation in the management of this infection. This variation in generations could lead to experience related practices rather than recommended practices. Majority of the participants were males (65.0%). One quarter of participants were university teachers and 38 participants (95.0%) agreed to participate in continuous medical education (CME). CME is defined as 'any activity that is intended to maintain, develop or increase the knowledge, skills, and professional performance and relationships that a physician uses to provide services for patients, the public, or the profession [9,10]. As such participating in CME as well as teaching in the university are some of the factors which could promote recommended practices on *H. pylori* infection eradication in our setting. Gastroenterologists were only present in 6 out of the 10 regions in the country. This attests to the scarcity of these specialists and the relegation of management to general practitioners and internists highlighting the dire need for local guidelines.

Pre-eradication diagnostic tests for *H. pylori* infection detection were histology (82.5 %), rapid urea test (70.0%), stool antigen test (25.0%), urea breath test (17.5%), serology (12.5%), and bacterial culture (2.5%). The French Haute Autorité de Santé (HAS) as well the Maastricht V consensus recommend the use of urea breath test (UBT), rapid urea test (RUT), histology or stool antigen test (SAT) as pre-eradication diagnostic test [5,6]. Urea breath test (UBT) is the best recommended non-invasive test in the context of a 'test-and-treat strategy'. In clinical practice when there is an indication for endoscopy, and there is no contraindication for biopsy, the rapid urease test (RUT) is recommended as a first-line diagnostic test [5]. Histology remains the standard diagnostic method as it provides critical information related to the mucosa (presence and severity of inflammation, intestinal metaplasia, glandular atrophy, dysplasia, and neoplasia) [10]. Though most participants used recommended pre-eradication diagnostic test, a few however used serology (5 participants) and bacterial culture (1participant) as pre-eradication diagnostic test. According to the HAS, serology is indicated for pre-treatment *H. pylori* testing with the objective of avoiding gastroscopy in H. pylori-negative patients who are unlikely to have a severe gastroscopy lesion and to refer H. pylori-positive patients for a gastric endoscopic assessment. Also, in clinical scenarios such as gastrointestinal bleeding, gastric carcinoma, MALT lymphoma, and atrophic gastritis, the serological method is the efficient diagnostic method since serological methods are less likely confounded by suppression of *H. pylori* by PPIs and antibiotics [6,10]. Serological tests presenting high accuracy, and locally validated, can be used in this case for non-invasive *H. pylori* diagnosis [11]. Bacterial culture is only recommended in case of failure of eradication after 2 lines of treatment and in this case, gastroscopy with biopsies for antibiotic susceptibility has to be done [6].

Eight participants (20.0%) performed between 1-2 biopsies for *H. pylori* infection detection while 16 participants (40.0%)

performed between 3-4 biopsies and 16 other participants (40.0%) performed at least 5 biopsies for *H. pylori* infection testing. All respondents performed biopsies in the antrum while 26 (65.0%) respondents performed biopsies in the incisura angularis, 30 participants (75.0%) in the corpus and 1 participant (2.5%) in the duodenum. The HAS as well as the Maastricht V/ Florence consensus recommend 5 biopsy samples (2 in the antrum, 2 in the corpus and 1 in the incisura angularis) for histology [5,6]. One participant however took biopsy samples from the duodenum. Sixty percent of participants did not follow recommended practices on the number of biopsy specimens and biopsy sites.

The treatment schemes used as first line for *H. pylori* infection eradication were; non-bismuth concomitant quadruple therapy by 28 participants (70.0%), sequential triple therapy by 8 participants (20.0%), concomitant triple therapy 3 participants (7.5%]) and bismuth concomitant quadruple therapy 1 participant (2.5%). The corresponding drug regimens included double dose PPI+ Amoxicillin+ Clarithromycin+ metronidazole by 28 (70.0%) of respondents, PPI + Amoxicillin then PPI + Clarithromycin +metronidazole by 8 (20.0%) of participants, PPI+ Amoxicillin +Clarithromycin by 3 (7.5%) of participants and PPI+ Bismuth+ Tetracycline + metronidazole quadruple therapy, 1 participant. Treatment duration varied between 10 to 14 days depending on whether it was sequential and bismuth quadruple therapy or concomitant therapy. The Maastricht V/ Florence consensus recommends that in areas of high (>15%) clarithromycin resistance, bismuth quadruple or non-bismuth quadruple, concomitant (PPI, amoxicillin, clarithromycin and a nitroimidazole) therapies are recommended while in areas of high dual clarithromycin and metronidazole resistance, bismuth quadruple therapy (BQT) is the recommended first-line treatment [5]. The HAS recommends that in the absence of antibiotic susceptibility testing the recommended first-line treatment is concomitant quadruple therapy for 14 days combining a PPI, amoxicillin, clarithromycin and metronidazole or bismuth quadruple therapy for 10 days [7]. Twenty-nine (72.5%) of participants practiced the above recommendations and this in the absence of local guidelines. However, eradication rates as well as antibiotic susceptibility and resistance patterns vary across different regions in Africa. In Tunisia, North Africa, the eradication rate has been reported significantly higher among patients treated by omeprazole, amoxicillin and clarithromycin (69.6%) compared to those treated with omeprazole, amoxicillin and metronidazole (48.7%) [8]. In Nigeria, West Africa, an RCT comparing a 7-days vs a 10-days regimen of rabeprazole, amoxicillin and clarithromycin was carried out in 50 *H. pylori* positive patients revealed an average eradication rate of 87.2% without significant difference between the two regimens. In Kenya, East Africa, an RCT comparing the efficacy of 7-days vs a 14-days regimen using esomeprazole, amoxicillin and clarithromycin showed eradication rates of 76.7% and 73.3% for 7 and 14 days respectively [8]. A study in 2019 in Cameroon comparing quadruple and sequential therapy eradication rates respectively showed a 79% against 65.5% eradication rate [12]. Though there are no local guidelines, there's however local evidence for the superiority of quadruple therapy as opposed to sequential therapy in Cameroon.

Regarding resistance and susceptibility patterns and focusing on North Africa in Egypt AST showed high phenotypic metronidazole resistance (100%) of *H. pylori* to metronidazole, in Tunisia, using both E-test and real-time PCR with Scorpion primers, resistances to clarithromycin and metronidazole were 15.4% and 51.3% respectively, with 0% resistance to amoxicillin [8]. In Algeria, the prevalence of *H. pylori* resistance to clarithromycin was 33% [13]. Hence, considering that the resistance rate to clarithromycin is largely over the 15%-20% threshold put forward by the Maastricht V Consensus Report, it is appropriate to quit the clarithromycin-based treatment as a first-line strategy in several areas of North Africa [5]. In Senegal, West Africa, a high rate of resistance to metronidazole (85%), low rate of resistance to clarithromycin (1%), and no resistance to amoxicillin and tetracycline was reported. In Nigeria, Aboderin et al in the year 2007 reported multiple *H. pylori* resistance to amoxicillin (100%), clarithromycin (100%) and metronidazole (100%) [8].

In Congo, Central Africa, *H. pylori* resistance to clarithromycin and tetracycline were low (1.7 and 2.5% respectively) but a high rate of resistance (50%) to fluoroquinolones was reported [8]. A study from Cameroon reported high resistance rates to tetracycline, clarithromycin and metronidazole (44.7%, 85.6% and 93.2%, respectively). In Uganda, 29% resistance to clarithromycin and 42% to fluoroquinolones were reported [8]. Hence, in these countries a clarithromycin-based therapy could represent an appropriate therapeutic strategy. These variations across the African continent highlights the need for treatment protocols adapted to our local realities. The main post-eradication control test used included: urea breath test; 22 participants (55.0%), histology; 13 participants (32.5%), stool antigen test; 10 participants (25.0%) rapid urea test; 6 participants (15.0%) and serology; 3 participants (7.5%). Recommended practices on post- eradication control test include the use of the urea breath test, stool antigen test or histology for eradication control, 4 weeks after completion of therapy or 2 weeks after stopping PPI [5,7]. However, 6 participants used the rapid urea test while 3 other participants use serology for post-eradication control which are not recommended practices. More so, only 13 participants (32.5%) systematically requested for eradication control in all patients while 25 participants (62.5%) requested in special cases such as ulcers, metaplasia, and dysplasia. Eighteen respondents (45.0%) requested for eradication control at 4 weeks post–completion of treatment, 12 (30.0%) respondents between 4-8 weeks post completion of treatment, 6 (15.0%) at 8 weeks post completion of treatment. The absence of systematic eradication control amongst participants could be explained by the fact that urea breath and stool antigen test are not readily available in our setting and the cost isn't neglected. Equally treated patients don't show up for eradication control when there are relieved of symptoms even when they've received prescriptions for eradication control probably due to the absence of universal health coverage in our setting.

In the case of established proof of eradication failure 28 participants (70.0%) prescribed alternative drug regimens, 4 participants (10.0%) collected samples for bacterial culture, 3 participants (7.5%) prescribed alternative drug regimens and if

failure samples for bacterial culture, 3 other respondents (7.5%) prescribed PPI in the presence of symptoms, 1 participant prolonged the duration of the previous regimen while 1 other participant did nothing. The HAS recommends that in the case of failure of eradication after 2 lines of treatment, gastroscopy with biopsies for antibiotic susceptibility testing by biopsy culture [7]. However bacterial culture is not readily available in our setting and is also costly

5. Conclusion

In Cameroon most gastroenterologists had practices like those recommended in the developed world on the management of HPI with some degree of variability. This variability in practices observed justifies the need for local guidelines based on empirical evidence of treatment efficacy, available diagnostic test and cost-efficiency.

Ethical Approval

Ethical approval was obtained from the Institutional Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé 1.

Consent to Participate

All participants signed an informed consent form.

Authors' Contributions

Tangie Ngek Larry writing of protocol, study design, data collection, initial draft.
Ndjitoyap Ndam Antonin Wilson correction of protocol, review of the initial draft.
Kowo Mathurin review of final draft, supervision
Ankouane Andoulo supervision
Njoya Oudou study conception, general supervision and orientations

Data Availability

All supplementary tables and search queries used have been made available in the manuscript.

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