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Epidemiological and Histopathological Aspects of Chronic Gastritis at the Departmental University Teaching Hospital of Borgou Alibori (CHUD-BA) from 2011 to 2021

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Abstract

Background: Gastritis is better evaluated nowadays since the advent of upper gastrointestinal endoscopy. Despite the availability of this workup in Benin Republic, there is a scarcity of data on chronic gastritis. Objective: This work aimed to study the epidemiological and histopathological aspects of chronic gastritis in the Departmental University Teaching Hospital of Borgou Alibori (CHUD-B/A) from 2011 to 2021. Method: This was a retrospective cross-sectional study with descriptive and analytical purposes, carried out from February 23, 2022 to May 23, 2022, among patients who had undergone gastric biopsy and/or gastrectomy from January 2011 to January 2022 (10 year), and whose specimens were sent into the histopathology section of the CHUD-B/A. Non-probability sampling was performed with exhaustive recruitment. A survey form has been used to collect data from patients' medical records. Pearson's chi-square and Fisher's exact tests have been used as appropriate to determine correlations between variables. Result: A total of 310 cases of chronic gastritis were diagnosed in the histopathology section of the CHUD-B/A from 2011 to 2021. This represented a chronic gastritis frequency of 91.45% for all gastric lesions diagnosed throughout the study period. Erythematous gastropathy was the most frequent (70.35%). *Helicobacter pylori* was present in 36.77% and dysplasia was observed in 12.26% of cases. Erythematous gastropathy was a predictive factor for the absence of gastric dysplasia in histopathology check up (p-value = 0.042). In contrast, intestinal

metaplasia was predictive of the presence of gastric dysplasia in histopathology check up (p-value < 0.001). Conclusion: Chronic gastritis is very common in our setting. Systematic biopsy performance in front of an evocative clinical situation followed by histopathological examination may be encouraged.

Keywords

Epidemiology, Histopathology, Chronic Gastritis, Dysplasia, Parakou (Benin)

1. Introduction

Gastritis is a diffuse or localized inflammatory disease affecting gastric mucosa. They are classified into acute and chronic gastritis [1]. Acute gastritis is characterized by intense manifestations, but it is uncommon and rapidly regressive. Chronic gastritis in contrast, is the most common. Epigastric pain or dyspeptic syndrome is usually found in questioning patients but these symptoms remain non-specific [2]. The distribution of chronic gastritis according to age group varies from country to country. Very high in developing countries, chronic gastritis prevalence is low in western countries. Actually, the increase of the age-specific prevalence of gastritis by age is more pronounced and abrupt in the developing than in the developed populations, *i.e.*, the prevalence of gastritis in young age-groups, or even in childhood, in much more than 50% in developing populations, whereas this prevalence in developed population is typically much less than 50% [3]. In western Africa, several studies have shown that chronic gastritis represents more than 80% of gastric pathologies [4] [5] [6].

Chronic gastritis etiologies are numerous and dominated by *Helicobacter pylori* infection [7]. It is rarely caused by an autoimmune process [2]. The high frequency of chronic gastritis across the world is indeed related to *Helicobacter pylori*, a bacterium discovered in 1982 by Marshall and Warren [8]. It was estimated that about half of the world's population is infected with *Helicobacter pylori* [7] [9]. In developed countries, the prevalence varies from 20% to 40%. But in developing countries, 70% to 90% of the population is affected, making it a real public health problem [10]. Low socioeconomic status, crowded urban areas, young population and community life are risk factors for this infection [11] [12]. It has been recently evidenced that, *Helicobacter pylori* infection prevalence was higher in Africa (79.1%), South America (69.4%) and Asia (54.7%), while it was lower in North America (37.1%) and Oceania (24.4%) [9]. In Benin, a seroprevalence of 75.4% in urban areas (Cotonou) and 72.3% in rural areas (Pahou) has been reported [13]. Most people infected during childhood remain so throughout their lives. A study conducted in northern Benin by Agossou *et al.* [14] in 2018 has shown a *Helicobacter pylori* infection seroprevalence of 60.4% among children.

Gastritis is better evaluated nowadays since the advent of upper gastrointestinal endoscopy [15]. The latter allows macroscopic description of the lesions and especially biopsy performance for histopathological confirmation of the di-

agnosis. There is a low correlation between endoscopic aspects and histopathology's outcomes [16]. It has also been demonstrated for several decades that *Helicobacter pylori*-related chronic gastritis and those from autoimmune process are associated with epithelial changes that can progress to glandular atrophy, intestinal metaplasia, dysplasia and even gastric cancer [17]. Progression to gastric cancer is rare but always possible and remains the clinician's main haunting. Carcinogenesis risk is much higher when the etiology is related to *Helicobacter pylori* infection [18]. The speed of transition from precancerous condition to cancer is extremely variable from a subject to another [19] [20]. This variability requires histological monitoring for patients with precancerous conditions. In order to better assess these parameters, gastritis have been the interest of several classifications. Sydney System coding is the most recent [21]. Pathologists' reports are presented according to this classification.

In Africa, where previous studies have reported *Helicobacter pylori* infection prevalence near 80%, it was important to study chronic gastritis in order to identify patients at risk for gastric cancer and requiring special surveillance. It was for this purpose that several studies have been conducted on gastritis in the sub-region, particularly in Mali, Togo, Burkina Faso, Senegal, and Nigeria [5] [6] [22] [23] [24]. In Benin, we do not have updated information on the frequency of gastritis at both hospital and population levels. However, according to the study carried out by Kodjoh *et al.* [25], in 1991 in Cotonou (Benin), gastritis accounted for 47% of gastroesophageal diseases. According to the study of Kpossou *et al.* [26] carried out in Cotonou in 2020, gastric cancers, whose mortality rate remains high worldwide, represented 12% of digestive cancers. Regarding this non-negligible frequency and the relationship between gastric cancer, chronic gastritis and *Helicobacter pylori* infection, we initiated this work with the aim of providing recent data on chronic gastritis in Benin Republic.

This work aimed to study the epidemiological and histopathological aspects of chronic gastritis in the Departmental University Teaching Hospital of Borgou Alibori (CHUD-B/A) from 2011 to 2021.

2. Method

This study was carried out in the histopathology section of the Departmental University Teaching Hospital of Borgou Alibori (CHUD-B/A). This was a retrospective cross-sectional study with descriptive and analytical purposes. The study population consisted of all patients who had undergone gastric biopsy and/or gastrectomy from January 2011 to January 2022 (10 years) and whose specimens were sent into the histopathology section of the CHUD-B/A. Included in this study were patients with a histological diagnosis of chronic gastritis. Patients whose medical records could not be located or were not retrievable were not included in this study. Non-probability sampling was performed with exhaustive recruitment of all patients meeting the inclusion criteria throughout the study period. Precancerous lesion (dysplasia) was the dependent variable in this study. It was dichotomized into absent and present. Co-variables were soci-

odemographic characteristics of the patients (age, gender, ethnicity, area of residence), endoscopic aspects (reason for requesting upper gastrointestinal endoscopy, gastric lesion observed in upper gastrointestinal endoscopy), histopathological aspects (degree of inflammation, cellular activity, glandular atrophy, intestinal metaplasia, dysplasia, lymphoid follicles, *Helicobacter pylori* and other associated lesions). A survey form collecting information on the above listed variables has been used for data collection. The data were collected from the medical records of each patient located in the histopathology section of the CHUD-B/A by a doctoral student in general medicine at Parakou University. Data collection lasted three months from February 23, 2022 to May 23, 2022. Data analysis was implemented with EPI DATA ANALYSIS 2.3. Pearson's chi-square and Fisher's exact tests have been used as appropriate to determine correlations between variables. Variables with a p-value less than 20% were considered significant in bivariate analysis and included in a logistic regression model in multivariate analysis. A 5% significance level was considered for the multivariate analysis.

From January 2011 to December 2021, gastroscopies were performed by physicians specialized in gastroenterology, without sedation, in patients who had been fasting for at least six (6) hours. The samples were immediately fixed with 10% formalin and sent into the histopathology section of the CHUD-B/A with a form filled in by the gastroenterologists. On the other hand, gastrectomies were performed by physicians specialized in general surgery or visceral surgery. The gastrectomy specimens were oriented and immediately fixed in 10% formalin, then sent into the histopathology section of the CHUD-B/A with a form filled in by the surgeons. The histological examination of the specimens was performed by physicians specialized in histopathology assisted by laboratory technicians. The classification system of gastritis used in the report of these pathologists was the Sydney system.

3. Result

A total of 339 gastric biopsies and gastrectomies have been examined in the histopathology section of the Departmental University Teaching Hospital of Borgou Alibori (CHUD-B/A) from 2011 to 2021, among which 310 were chronic gastritis. This represents a chronic gastritis frequency of 91.45%.

3.1. Socio-Demographic Characteristics of the Sample

The mean age of the patients was 43.90 ± 15.60 years with extremes of 4 and 80 years. The 40 - 59 years age group was the most represented (41.94%). Among the 310 patients included in this study, there was a predominance of women with a male-to-female ratio of 0.83. Patients from Bariba ethnicity were the most represented (29.03%), followed by Fon and related (20.97%). The majority of the patients lived in urban areas (70.65%) (Table 1).

3.2. Endoscopic Aspects

Epigastric pain was the most frequent reason for requesting upper gastrointestinal endoscopy (53.23%) followed by gastroesophageal reflux (18.39%). Erythe-

matous gastropathy represented 70.35% of lesions observed in upper gastrointestinal endoscopy, followed by erosive gastritis (15.03%) (Table 2).

Table 1. Distribution of participants according to socio-demographic characteristics (n = 310).

	Size	Percentage (%)
Age group (year)		
<20	14	4.52
[20 – 39]	107	34.52
[40 – 59]	130	41.94
≥60	59	19.03
Gender		
Male	141	45.48
Female	169	54.52
Ethnicity		
Bariba	90	29.03
Fon and related	65	20.97
Dendi and related	48	15.48
Nago and related	34	10.97
Peulh	31	10.00
Ditamari and related	24	7.74
Yom/Lokpa	10	3.23
Other	8	2.58
Area of residence		
Urban	219	70.65
Rural	91	29.35

Table 2. Distribution of participants according to endoscopic aspects (n = 310).

	Size	Percentage (%)
Reason for requesting upper gastrointestinal endoscopy		
Epigastric pain	165	53.23
gastroesophageal reflux	57	18.39
Dyspepsia	30	9.46
Other[a]	58	18.72
Lesion observed in upper gastrointestinal endoscopy		
Erythematous gastropathy	218	70.35
Erosive gastritis	47	15.03
Gastric ulcer	18	5.81
Micronodular aspect	20	6.45
Other[b]	7	2.36

a: Caustic ingestion, Anemia, Upper gastrointestinal hemorrhage, Dysphagia or Odynophagia, Periumbilical pain, Left hypochondrium pain, Diffuse abdominal pain, Vomiting, Weight loss. b: Ulcerated gastritis, Large fundial folds, Sessile polyp.

3.3. Histopathological Aspects

Based on Sydney's parameters assessment, among the 310 patients with chronic gastritis included in this study, 215 (69.35%) had moderate degree of inflammation, 251 (80.97%) had cellular activity and 171 (55.16%) had glandular atrophy. In addition, intestinal metaplasia was present in 52 patients (16.77%) and lymphoid follicles in 28 patients (9.03%). Dysplasia was observed in 38 patients (12.26%). Helicobacter pylori was identified histologically in 114 patients (36.77%) (Table 3).

Table 3. Distribution of participants according to histopathological aspects (n = 310).

	Size	Percentage (%)
Degree of inflammation		
Slight	25	8.06
Moderate	215	69.35
Severe	72	22.58
Cellular activity		
Absent	59	18.39
Slight	155	50.00
Medium	89	28.71
Severe	9	2.90
Glandular atrophy		
Absent	139	44.84
Slight	109	35.16
Moderate	60	19.35
Severe	2	0.65
Intestinal metaplasia		
Absent	258	83.23
Slight	30	9.68
Moderate	19	6.13
Severe	3	0.97
Lymphoid follicles		
Absent	282	90.97
Present	28	9.03
Helicobacter pylori		
Absent	196	63.23
Low density	68	21.94
Moderate density	37	11.94
Severe density	9	2.90
Dysplasia		
Absent	272	87.74
Slight	30	9.68
Moderate	4	1.29
Severe	4	1.29

3.4. Correlation between the Presence of Dysplasia and the Covariables in Bivariate Analysis

In bivariate analysis, socio-demographic characteristics, notably gender and age, were not statistically associated with the presence of dysplasia with p-values of 0.921 and 0.399 respectively. Endoscopically, erythematous gastropathy was statistically associated with the presence of dysplasia (p-value = 0.005). Still, patients with erythematous gastropathy were less likely to progress to gastric dysplasia [0.13 - 0.73] than those with other endoscopic aspects. Histologically, Sydney's parameters including the degree of inflammation, the presence of cellular activity and the presence of glandular atrophy were statistically associated with the presence of gastric dysplasia with p-values of 0.005, 0.110 and 0.158 respectively. Indeed, patients with moderate or severe inflammation were 3.02 and 5.47 times more likely to progress to gastric dysplasia, respectively. Patients with glandular atrophy were 2.95 times more likely to progress to gastric dysplasia. In addition, intestinal metaplasia was statistically associated with the presence of gastric dysplasia (p-value < 0.001). Patients with intestinal metaplasia were 8.33 times more likely to progress to gastric dysplasia. In contrast, the presence of *Helicobacter pylori* and the presence of lymphoid follicles were not statistically associated with progression to gastric dysplasia with p-values of 0.813 and 0.387 respectively (**Table 4**).

3.5. Correlation between the Presence of Dysplasia and the Covariables in Multivariate Analysis

In multivariate analysis, Sydney's parameters, notably the degree of inflammation, the presence of cellular activity and the presence of glandular atrophy were not statistically associated with the presence of gastric dysplasia with p-values of 0.066, 0.879 and 0.153 respectively. On the other hand, the presence of erythematous gastropathy in upper gastrointestinal endoscopy was statistically associated with the presence of gastric dysplasia (p-value = 0.042). However, patients with erythematous gastropathy were less likely to progress to gastric dysplasia [0.04 - 0.77] than those with other endoscopic aspects. Furthermore, the presence of intestinal metaplasia in histopathology check up was statistically associated with progression to gastric dysplasia (p-value < 0.001). Patients with intestinal metaplasia were 6.77 times more likely to progress to gastric dysplasia (**Table 5**).

4. Discussion

4.1. Frequency of Chronic Gastritis

In this study, the frequency of chronic gastritis was 91.45%. This high prevalence is close to the 93.1% found by Konaté *et al.* [6] in Mali, and the 98.2% found by Bamba *et al.* in Senegal in 2017 [4]. Prevalences also close to ours, namely 85.8%, 83.44% and 81% were respectively reported by Essadik *et al.* [10] in Morocco in 2013, Darré *et al.* [5] in Togo in 2010 and Doh *et al.* [23] in Senegal in 2016. On

the other hand, a lower prevalence of 53% was reported in the French population by Potet *et al.* [27]. This disparity could be explained by the higher prevalence of *Helicobacter pylori* in developing countries [9].

Table 4. Correlation between the presence of dysplasia and covariables in bivariate analysis (n = 310).

	OR	95% IC	p-value
Gender			
Female	1	.	0.921
Male	0.97	0.49 - 1.91	
Age group			
<20	1		
20 - 39	1.64	0.20 - 13.69	0.399
40 - 49	1.57	0.19 - 12.92	
≥60	2.98	0.35 - 25.24	
Erythematous gastropathy in upper gastrointestinal endoscopy			
No	1	.	0.005
Yes	0.31	0.13 - 0.73	
Degree of inflammation			
Slight	1		
Moderate	3.02	0.39 - 23.31	0.110
Severe	5.47	0.68 - 44.22	
Cellular activity			
Absent	1		
Slight	0.84	0.31 - 2.31	0.158
Medium	1.86	0.68 - 5.09	
Severe	2.43	0.41 - 14.47	
Glandular atrophy			
No	1	.	0.004
Yes	2.95	1.35 - 6.47	
Intestinal metaplasia			
No	1	.	<0.001
Yes	8.33	4.00 - 17.39	
Helicobacter pylori			
Absent	1	.	
Low density	1.00	0.43 - 2.36	0.813
Moderate density	1.18	0.42 - 3.32	
Severe density	2.15	0.42 - 10.29	
Lymphoid follicles			
Absent	1	.	0.387
Present	0.53	0.12 - 2.31	

Table 5. Correlation between the presence of dysplasia and covariables in multivariate analysis (n = 310).

	aOR	95% IC	p-value
Erythematous gastropathy in upper gastrointestinal endoscopy	0.43	0.04 - 0.77	0.042
Degree of inflammation	1.97	0.95 - 4.07	0.066
Cellular activity	3.34	0.30 - 2.81	0.879
Glandular Atrophy	1.96	0.78 - 4.93	0.153
Intestinal metaplasia	6.77	3.07 - 14.94	<0.001

4.2. Sociodemographic Characteristics

- **Age**

In this study, the mean age of the patients was 43.90 years. Similar findings to ours were reported by Koura *et al.* [22] in 2017 in Burkina-Faso and Itoudi *et al.* [28] in 2014 in Gabon which were 43.2 and 44 years respectively. However, our finding was slightly higher than that of Doh *et al.* [23] in Senegal in 2016 (39.9 years) and Konaté *et al.* [6] in Mali in 2007 (38.14 years). On the other hand, it was lower than that of Bamba *et al.* in Senegal in 2017 (45 years), Darré *et al.* in Togo (49.3 years) and Ray-Offor *et al.* [24] in 2017 in Nigeria (47.1 years). In France, Potet *et al.* [27] reported a mean age of 53 years, which is much higher than ours and those for most African studies. This difference could be attributed to the old age of the Western population compared to African populations.

- **Gender**

In this study, 54.52% of the patients were female. This female predominance was also reported by Koura *et al.* [22] in Burkina Faso (53.3%), Bamba *et al.* [4] in Senegal (61%), Essadik *et al.* in Morocco (53.1%) and Du *et al.* [29] in China (51.2%). Several other African studies have also reported this female predominance [6] [23] [28]. In contrast, a male predominance was reported by Darré *et al.* [5] in Togo, Ray-Offor *et al.* [24] in Nigeria, Attia *et al.* [30], and Diomandé *et al.* [31] in Côte d'Ivoire where the male-to-female ratios were 1.4, 1.2, 2 and 1.3 respectively. Anyway, the main cause of chronic gastritis is *Helicobacter Pylori* infection. Indeed, gender is not a risk factor for this infection. Rather, it is favored by individual characteristics, hygiene and socioeconomic conditions [32].

- **Area of residence**

In this study, 70.65% of the patients lived in an urban area in Parakou. This finding is close to the 77.8% reported by Ankouane *et al.* [33] in 2013 in urban areas in Cameroon. Actually, patients living in urban areas in Parakou have easier access to the CHUD-B/A. This could justify their predominance in our study.

4.3. Endoscopic Aspects

In this study, epigastric pain was the most frequent reason for requesting upper gastrointestinal endoscopy (53.23%) followed by gastroesophageal reflux (18.39%).

In the study of Koura *et al.* [22] in Burkina-Faso, epigastric pain was also the most frequent reason for requesting endoscopy with a finding very close to ours (52.8%). Bagny *et al.* [34] in Togo in 2011 reported a frequency of epigastric pain of 48.8%. Bamba *et al.* [4] in 2017 in Senegal found a much higher frequency of epigastric pain (91%) followed by dyspepsia (22%). Indeed, epigastric pain is the most encountered symptom because it is a clinical manifestation of the inflammatory reaction taking place within the gastric mucosa. In fact, in the classic semiological tetrad of the local inflammatory syndrome, there is redness (erythematous aspect in endoscopy), heat, swelling and pain manifested here by epigastric pain. In this study, erythematous gastropathy represented 70.35% of the lesions found in upper gastrointestinal endoscopy, followed by erosive gastritis (15.03%). Bamba *et al.* [4] in Senegal in 2017 reported a higher prevalence of erosive gastropathy of 90%. A lower prevalence of erythematous gastropathy was found by Bagny *et al.* [34] in Togo in 2011 (36.2%). This difference could be due to the inclusion in these studies of patients with symptoms suggestive of gastric involvement. In addition, 5.81% of lesions in our study were gastric ulcerations against 7% in Ray-Offor *et al.* [24] in Nigeria and 13.79% Bentahar *et al.* [35] in Algeria in 2016. Micronodular aspect which would be an indicator of Hp infection in endoscopy [36] was present in our study in 6.45% of cases against 4% in Bamba *et al.* in Senegal. This fluctuation in proportions may be related to the different sample sizes.

4.4. Anatomopathological Aspects

- **Degree of inflammation**

The degree of inflammation was moderate according to Sydney classification, in most cases (69.35%). This predominance of moderate degree of inflammation was also reported in Togo (71%) and Senegal (52.7%) [4] [5].

- **Cellular activity**

Cellular activity (presence of neutrophils) was noted in 80.97% of cases. This cellular activity was medium according to Sydney classification in most cases (61.75%). Similar proportions of cellular activity were reported in Côte d'Ivoire (81.4%) and Togo (83.81%) [5] [30]. The high proportion of active chronic gastritis in this study and in most African countries should be related to the pathogenicity of *Helicobacter pylori*. Several studies have shown that cellular activity was significantly associated with *Helicobacter pylori* infection [28] [37].

- **Glandular atrophy**

In our study, glandular atrophy was observed in 55.16% of cases. It was present, according to the Sydney classification, at moderate intensity in 63.74%. This prevalence of glandular atrophy in this study is close to that found by Udoh *et al.* [38] in Nigeria in 2009 (53%). Ankouane *et al.* [39] in Cameroon in 2014 and Darré *et al.* in Togo in 2010 found much higher prevalence (74.7% and 83%). Koura *et al.* [22] in Burkina-Faso in 2017, in contrast, noted a lower prevalence than in this study (26.8%). This is also the observation in Senegal where studies

conducted noted very low prevalence of glandular atrophy, less than 20% [4] [23].

- ***Helicobacter pylori***

Histologically, *Helicobacter pylori* infection was reported in 36.77% of chronic gastritis cases. It was present in 59.65% with low density. This prevalence of *Helicobacter pylori* is much lower than those reported in Mali by Konaté *et al.* [6] in 2007 (89.4%). The same is true for Jmaa *et al.* [40] in Tunisia in 2005, Essadik *et al.* [10] in 2011 in Morocco, Doh *et al.* [23] in 2016 in Senegal who found respective prevalence of 87.8%, 69.2% and 75.6% largely higher than ours. Lower prevalence than the latter but still higher than ours were found by Koura *et al.* [22] (58.3%) in Burkina-Faso in 2017 and Bagny *et al.* [34] (53.4%) in Togo in 2011. This low prevalence in our study could be explained in several ways. First, the retrospective nature of the study certainly took into account cases of chronic gastritis treated either by the physician or self-medication with antibiotics or traditional treatment (phytotherapy) which is very frequent in our setting. The most represented patients in the study belonged to the 40-59 years age group, whereas *Helicobacter pylori* infection is much more frequent in young patients. The absence of the use of special stains such as modified Giemsa that allow better visualization of *Helicobacter pylori* could also explain this prevalence. In industrialized countries, the prevalence is generally low. Sethi *et al.* [41] in 2011 in Canada and Verma *et al.* [42] in 2009 in the United States reported 37.9% and 23.7% by histological examination of gastric biopsy respectively. This low prevalence could be explained by the high socioeconomic level of developed countries. In addition, in the study of Sethi *et al.* in Canada, it was a specific population without functional signs and the biopsies were performed in a preoperative context. Kpossou *et al.* [43] in southern Benin in 2018 noted a prevalence of 34.7%. This result is lower than ours. The difference could be explained by the *Helicobacter pylori* diagnosis method used. Indeed, these authors used an indirect method (carbon-14 urea breath test), unlike our study where the diagnosis was made by histopathological check up of gastric biopsies, which is the conventional reference method for the detection of *Helicobacter pylori*.

- **Intestinal metaplasia**

The prevalence of intestinal metaplasia in our study was 16.77%. Udoh *et al.* in Nigeria [38] reported a prevalence of metaplasia consistent with ours (16.6%). This prevalence was higher than that reported by Koura *et al.* [22] in Burkina-Faso (13.5%), Bamba *et al.* [4] in Senegal in 2017 (11.5%) and that of Ankouane in Cameroon in 2014 (6.3%). Darré *et al.* [5] in Togo in 2010 found a higher prevalence (54.25%).

- **Dysplasia**

The prevalence of dysplasia in our study was 12.26. Doh *et al.* [23] in Senegal in 2016 found a prevalence close to ours (11.1%). In contrast, it was very low in Bamba *et al.* in 2017 (1.7%) who had a larger population [4]. Very low findings were also reported in Nigeria by Ray-Offor [24] in 2017 (5.8%) and Jemilehoun

et al. [44] (2.4%) in an original research published in 2020. These discrepancies in the prevalence of precancerous lesions could be explained by the fact that their distribution varies from country to country [18] [39] [40]. Indeed, the environmental factors and socioeconomic conditions that determine the high-risk groups for gastric cancer vary from country to country, and within the same country differ between regions [18]. In very high-risk groups such as Japan and China, and some high-risk groups (Blacks, Hispanics, and in the United States of America, gastric precancerous condition rates are generally very high [39] [40] [45] [46] [47]. These differences in the prevalence of precancerous conditions may also be related to the different sample sizes and the site of the gastric biopsy.

4.5. Factors Associated with the Presence of Dysplasia

- **Erythematous gastropathy on endoscopy**

This study has evidence that an erythematous gastropathy in upper gastrointestinal endoscopy would be a predictive factor of precancerous lesions absence in histopathology check up (p-value = 0.042). Indeed, precancerous lesions that occur after several decades are characterized by cellular and architectural changes that are reflected in the gastric mucosa by an atypical aspect and relief. Dysplasia then presents itself endoscopically as flat depressed or polypoid lesions [48]. The erythematous aspect visualized in endoscopy is the result of chronic inflammation of the mucosa generally caused by *Helicobacter pylori*, and marks the evolutionary cascade beginning [49] [50]. The long-term evolution would be the occurrence of pre-cancerous lesions. However, to date there is no clear correlation between endoscopic findings and histopathology outcomes. Many studies have demonstrated the low correlation between histopathology outcomes and endoscopic findings [51] [52]. But others also investigate possible associations. For example, an Iranian study has shown that abnormal endoscopic findings (both ulcerative and non-ulcerative) were associated with precancerous lesions [53].

- **Intestinal metaplasia**

Patients with histopathological evidence of intestinal metaplasia ($p < 0.001$) during chronic gastritis were more likely to develop precancerous lesions in this study. Indeed, gastric carcinogenesis is a multistep process that involves, in most of cases, a progression from normal mucosa to chronic gastritis (chronic inflammation of the gastric mucosa), to glandular atrophy (loss of gastric glands), to intestinal metaplasia (substitution of gastric epithelium by intestinal epithelium), to dysplasia and then to gastric cancer. This sequence of events can last for several years and has been referred to as Correa's cascade of multistep gastric carcinogenesis [54]. Intestinal metaplasia is considered a precancerous condition [48]. This is the rationale for this association. Indeed, well-established evidence points to an association between intestinal metaplasia and intestinal-type gastric cancer [55]. It is a lesion with a high risk of dysplasia and therefore of malignancy. In fact, it directly precedes dysplasia in Correa cascade [54]. Its extent

and topography would be reliable indicators of cancer risk [56]. Given this high risk of dysplasia, guidelines have been proposed for patients with intestinal metaplasia. They suggest metaplasia promoting factors elimination, notably *Helicobacter pylori*, and endoscopic surveillance for patients with intestinal metaplasia who are at increased risk for gastric cancer due to their ethnicity or family history. Optimal surveillance intervals have not been widely studied and must be individualized. For individuals with severe OLGA and OLGIM scores (stage III/IV), without dysplasia endoscopic surveillance with histopathological check up of gastric biopsies every 3 years is suggested. For individuals with a family history of cancer added to the previous conditions, an even more intense 1 - 2 year surveillance endoscopy has been suggested [57].

5. Limitation of the Study

This study is retrospective and therefore limited by the fact that it used medical records that were sometimes insufficiently informed. However, this did not affect the quality of the results.

6. Conclusion

At the end of this study, it appears that chronic gastritis is very common in our setting. Precancerous lesions that occur during their evolution are relatively low in this series, but associated with intestinal metaplasia, a lesion often caused by *Helicobacter pylori*. As gastric cancer is a public health problem around the world, identification of persons living with *Helicobacter pylori* or precancerous lesions is necessary for eradication and/or endoscopic surveillance purposes. For this reason, systematic biopsy performance in front of an evocative clinical situation followed by histopathological examination may be encouraged as the most reliable means for precancerous lesions diagnosis and therefore, for gastric cancer prevention.

Ethical Considerations

This research proposal was approved by the local ethics committee for biomedical research, University of Parakou. Informed consent was waived due to the retrospective aspect of the study.

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Conflicts of Interest

The authors declare no conflict of interest.

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