

Histomorphology of chronic gastritis using the Sydney classification system and the Olga staging system at the Laboratory of Anatomic Pathology, Faculty of Medicine, Universitas Sumatera Utara Medan

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Abstract

Background: Chronic gastritis is a chronic inflammation of the gastric mucosa and submucosa which is mostly caused by bacteria, mainly associated with *H. pylori*, causing damage or injury resulting in erosion of the stomach lining with clinical features of dyspepsia. The Sydney classification system is used to diagnose antrum-derived gastritis and corpus biopsy by assessing MN inflammation, PMN inflammation, glandular atrophy, intestinal metaplasia, and the presence of *H. pylori* bacteria. The Olga staging system is used to assess the degree of atrophy of glands that have a low risk and high risk of developing gastric malignancy.

Objective: To determine the histomorphology of chronic gastritis using the Sydney system classification and the atrophy stage using the Olga system.

Materials and Methods: Histomorphological re-observation was performed on chronic gastritis slides from antrum and corpus biopsy consisting of 114 cases. All characteristic data were obtained through medical record data and pathology archives. The statistical analysis was descriptive with a cross-sectional approach.

Results: There were 114 cases. In the Sydney system classification, the most common histomorphology at antrum and corpus locations are grade 1 of MN inflammation, grade 0 of PMN inflammation, grade 0 of glandular atrophy, grade 0 of metaplasia intestine, and the presence of *H. pylori* is grade 0. In the assessment of the atrophy stage according to the Olga system, the most are stage 0 and the least is stage 3.

Conclusion: The results of this study have various similarities with previous studies, but further investigation and research are needed for better results.

Key words: Chronic gastritis, Sydney system, OLGA system, histomorphology

Introduction

Chronic gastritis is a chronic inflammation of the mucosa and submucosa of the stomach of a chronic nature, mostly caused by *H. pylori* bacteria, drugs, and other irritants, causing damage and erosion of this lining.[1,2] Based on the results of research and observations conducted by the Indonesian Ministry of Health, the incidence of gastritis in several regions in Indonesia is still quite high, with a prevalence of 274.396 cases out of 238.452.952 people. The highest incidence of gastritis reached 91.6%, namely in the city of Medan, then in several other cities such as Surabaya 31.2%, Denpasar 46%, Jakarta 50%, Bandung 32.5%, Palembang 35.35%, Aceh 31.7%, and Pontianak 31.2%.[3,4,5,6]

The diagnosis of chronic gastritis must be made based on clinical symptoms, endoscopic examination, and tissue biopsy to assess histological features. [2,7] Assessment of tissue biopsy using the Sydney system classification with a visual analog scale, including assessing the presence or absence of *Helicobacter pylori* (*H. pylori*), polymorphonuclear (PMN) and mononuclear (MN) inflammation, glandular atrophy, presence of intestinal metaplasia at an antral or fundal location. [3,8,9] The recommended biopsy protocol is specimens in 2 compartments from antrum and corpus which are submitted separately to the anatomical pathology laboratory.[10,11,12]

International guidelines for carcinoma prevention use the Olga (Operative Link on Gastritis Assessment) staging system to distinguish between low-risk (stage 0 - II) and high-risk (stage III-IV) gastritis for cancer. The Olga system considers the stomach as a lesion indicating disease progression. Assessment of atrophy using the Olga system was carried out by assessing atrophy in the antrum and corpus, then calculating the atrophy score, and then classified it for staging. Atrophy is defined as the loss of glands in the gastric mucosa that can be replaced by connective tissue in the lamina propria.[3,12,13]

Materials and methods

The study was conducted with a cross-sectional approach which included collecting clinical data from medical records, including age, gender, ethnicity, and location of the biopsy (antrum and corpus), followed by a histomorphological examination of gastritis evaluated by three researchers through a microscopic examination on the Hematoxylin & Eosin staining slides.

The H&E stained histopathologic specimens were subjected to a retrospective review by the researchers. Histopathologic slides were examined according to the updated Sydney system standardized visual analogue scale.[14,15,16]

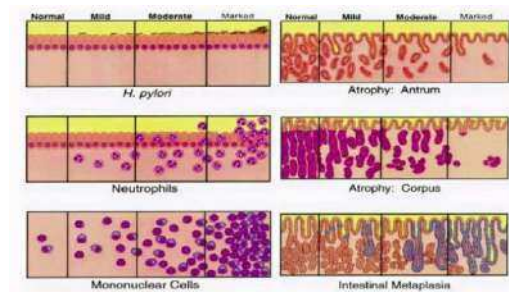


Fig. 1. The updated Sydney system standardized visual analogue scale.[14,15,16]

An assessment of glandular atrophy was obtained by combining the degree of atrophy with the histological score at the site of atrophy. The visual analog scale (VAS) is used as an example of how changes are seen at each level of biopsy sampling. The atrophy score in each biopsy was assessed as the percentage of atrophic glands. Atrophy was assessed on a four-level scale (no atrophy / 0%, score = 0; mild atrophy / 1-30%, score = 1; moderate atrophy / 31-60%, score = 2; and severe atrophy, > 60%, score = 3).[3,12,13]

Table 1. Olga staging system [12,13]

Atrofi score		Corpus			
		Score 0	Score 1	Score 2	Score 3
Antrum	Score 0	Stage 0	Stage I	Stage II	Stage II
	Score 1	Stage I	Stage I	Stage II	Stage III
	Score 2	Stage II	Stage II	Stage III	Stage IV
	Score 3	Stage III	Stage III	Stage IV	Stage IV

RESULTS

In this study, the data obtained came from the archives of the Department of Anatomical Pathology, Faculty of Medicine, Universitas Sumatera Utara, Medan and obtained 210 cases, while those that met the inclusion and exclusion criteria of the antrum and corpus biopsy tissue were 114 cases. The following are the results of the research obtained.

The most inflammation of MN in chronic gastritis according to the classification of the Sydney System is grade 1 MN inflammation, as many as 84 cases (73.7%) at the antrum location and as many as 85 cases (74.6%) at the corpus location. The least inflammation of MN was grade 0, namely 0 cases (0.0%) at the antrum location and as many as 3 cases (2.6%) at the corpus location. The most PMN inflammation was grade 0, namely 95 cases (83.3%) at the antrum location and 97 cases (85.1%) at the corpus location, and the lowest was grade 3, namely 0 cases (0.0%) at the location of the antrum and corpus. For the assessment of glandular atrophy, the most common grade was grade 0, namely 91 cases (79.8%) at the antrum location and 102 cases (89.5%) at the corpus location, which means that glandular atrophy was not found or there were still many normal. Intestinal metaplasia was not found, meaning that it was at grade 0, the most was 103 cases (90.4%) at the antrum location and as many as 106 cases (93.0%) at the corpus location, and the least was grade 3, namely as many as 0 cases (0.0%) at antrum and corpus location. The most common *H. pylori* was at grade 0, namely 111 cases (97.4%) at the antrum location and 114 cases (100%) at the corpus location, and the least number was grade 3, namely 0 cases (0, 0%) at the location of the antrum and corpus. (Table 2).

Table 2. Histomorphological distribution according to the Sydney system classification of chronic gastritis.

Histomorphological		Antrum		Korpus	
		Amount (n)	Percentage (%)	Amount (n)	Percentage (%)
Inflammation of MN					
-	0	0	0,0	3	2,6
-	1	84	73,7	85	74,6
-	2	20	17,5	18	15,8
-	3	10	8,8	8	7,0
Inflammation of PMN					
-	0	95	83,3	97	85,1
-	1	14	12,3	15	13,2
-	2	5	4,4	2	1,8
-	3	0	0	0	0
Glandular atrophy					
-	0	91	79,8	102	89,5
-	1	18	15,8	7	6,1
-	2	5	4,4	5	4,4
-	3	0	0	0	0
Metaplasia intestine					
-	0	103	90,4	106	93,0
-	1	10	8,8	6	5,3
-	2	1	0,9	2	1,8
-	3	0	0	0	0
H. pylori					
-	0	111	97,4	114	100,0
-	1	2	1,8	0	0,0
-	2	1	0,9	0	0,0
-	3	0	0	0	0
Amount		114	100	114	100

In this study, the mean age was 49.1 (\pm 13.7) years with the youngest age being 21 years and the oldest being 79 years. Most cases were aged 51-60 years, namely 30 cases (26.3%) and the least aged > 71 years were 7 cases (6.1%). Most of the sexes were male - 69 people (60.5%). The most common ethnic were the Batak, 29 cases (25.4%) and the least ethnic are Banjar, Nias and Chinese, each with 1 case (0.9%). The majority of the types were chemical gastritis / gastropathy as many as 72 cases (63.2%) and the lowest was gastritis H. pylori, 2 cases (1.8%). (Table 3).

Table 3. Distribution of samples based on clinicopathological parameters of chronic gastritis.

Clinical picture	Amount (n)	Percentage (%)
Age group , mean \pm SD years	49,1 \pm 13,7	
20-30 years	11	9,7
31-40 years	20	17,6
41-50 years	29	25,4
51-60 years	30	26,3
61-70 years	17	14,9
71-80 years	7	6,1
Gender		
Male	69	60,5

Female	45	39,5
Ethnic		
Karo	2	1,8
Mandailing	25	21,9
Melayu	10	8,8
India	1	0,9
Jawa	22	19,3
Batak	29	25,4
Banjar	1	0,9
Minang	9	7,9
Simalungun	4	3,5
Aceh	6	5,3
Nias	1	0,9
Palembang	3	2,6
Cina	1	0,9
Diagnose		
Chemical gastritis/gastropathy	72	63,2
Atrophic gastritis	23	20,2
Active chronic gastritis	7	6,1
H. pylori gastritis	2	1,8
Eosinophilic gastritis	2	1,8
Lymphocytic gastritis	8	7,0

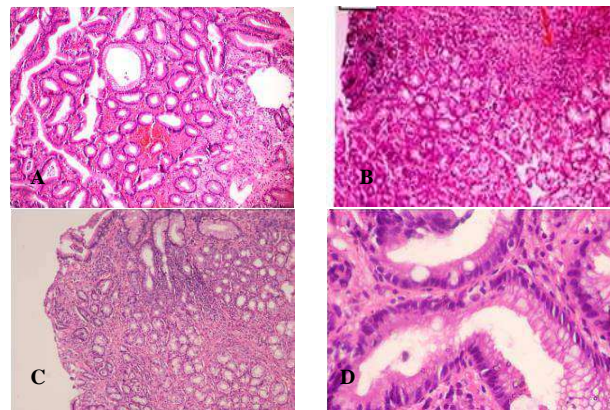


Fig 2. A. Infiltration of grade 1 MN inflammatory cells (H&E 100x) B. Infiltration of PMN inflammation (H&E 40x) C. Glandular atrophy (H&E 40x) D. Intestinal metaplasia (H&E 100x)

Assessment of atrophy staging according to the OLGA system, the most was staging 0 or no atrophy, as many as 89 cases (78.1%) and the least was staging 3 as many as 3 cases (2.6%), followed by staging 2 as many as 4 cases (3.5%) and staging 1 in 18 cases (15.8%) (Table 4).

Table 4. Distribution of atrophic staging according to the Olga system in chronic gastritis.

	Staging Olga	Amount (n)	Percentage (%)
-	Staging 0	89	78,1
-	Staging 1	18	15,8
-	Staging 2	4	3,5
-	Staging 3	3	2,6
-	Staging 4	0	0

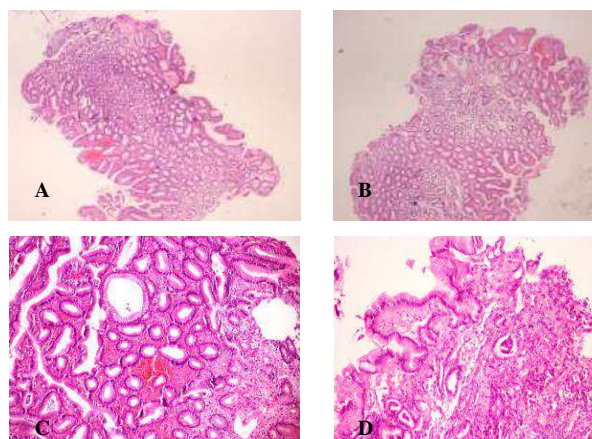


Fig 3. A&B. There was no atrophy at the site of the antrum and corpus (H&E 40x). **C.** Mild glandular atrophy (H&E 100x) **D.** Moderate glandular atrophy (H&E 100x)

DISCUSSION

Based on this study, it was found that there were more men than women (Table 3). This is in accordance with the study by Ariefanny et al, which showed that chronic gastritis was more common in men, as many as 66.7% of cases.[17] Tammasse IFU et al also found the same result that there are more men than women.[18] Nurdin et al also stated the same result with a male percentage of 50.6%. [3] However, the results of this study are different from the results of a study conducted by Hussein et al which found more female than male gender.[10] The differences in the results of this study may occur due to differences in eating habits or diets between male and female. In adulthood, there are differences in diet between male and female, this is due to differences in activity and body composition. Selection of food, women tend to avoid large portions and reduce the frequency of eating. Also related to the level of stress. In psychological theory, it is stated that female use feelings and emotions more so they are prone to experiencing psychological stress or anxiety in their lives.[19,20]

The age grouping of chronic ulcer patients is divided into six groups. In this study, it was found that the most chronic gastritis cases were aged 51-60 years with a percentage of 26.3%. This is in line with Nurdin et al's research, which mostly was at the age of 51-60 years, namely 36 cases (21.7%). [3] Hussein et al also obtained results that were not much different, most were > 60 years old.[10] In Ariefanny et al's study, it was not much different where the most age was 61-70 years.[17] Correspondingly, Garg et al. Also stated that the highest proportion was at the age of 46-60 years.[21] This is consistent with the theory that chronic gastritis is more common in adults than in children.[19]

Based on ethnicity, the Batak ethnic group is the most common with a percentage of 25.4%. This research was conducted in the city of Medan where the most ethnic groups in this city are the Batak people. Cultural and ethnic factors are very influential in eating habits, for example the amount of food eaten, the habit of eating spicy and sour foods. [19,20,22]

Chemical gastritis / gastropathy, one of the most common types of chronic gastritis in this study, was 63.2%. It is based on an analysis of data from the Sydney classification system. There is still not much research on this. Histopathological features according to the Sydney system classification, the degree of inflammation of MN that was most often found in the antrum and corpus was gradation 1 with a proportion of 73.7% and 74.6%. Similar to the study of Nurdin et al in 116 cases of chronic gastritis, stated that the highest degree of inflammation was grade 1 at the antrum and corpus location with a proportion of 69.3% and 83.1%. [3] Daniel and Mario's study had a different incidence of degree of inflammation, namely grade 2 in 46% of 200 cases. [23] Abdel et al stated that the highest degree of inflammation was 0 with a total of 170 cases out of 328 cases in the corpus area and 128 cases in the antrum area. [24] The difference in the results of this study has many factors, one of which is due to the long history of gastritis in the patient before the biopsy. This is consistent with the theory that gastritis is associated with a lot of inflammation of MN. [17]

Based on PMN activities, the most common ones were grade 0 in the antrum and corpus with a percentage of 83.3% and 85.1% of 114 cases. It is the same with Daniel and Mario's research which stated that grade 0 was the most with a percentage of 83.5% of 200 cases. [23] Husssein et al, said different results, where the most PMN inflammation was grade 2 with a percentage of 41.7% of cases from 100

samples that only came from the antrum. [10] According to Ariefiany, the most common result was grade 2. [17]

Assessment of glandular atrophy, the most grade was grade 0 or normal with a percentage of 79.8% in the antrum area and 89.5% in the corpus area. Similar to the study of Nurdin et al, that the grade of atrophy is grading 0 with a percentage of 47% in the antrum area and 74.1% in the corpus area of 166 cases. Ariefiany also stated that the most atrophic grading was 0 with a percentage of 64.3% in the antrum and corpus areas. Same with Daniel and Mario, who stated that grade 0 or normal was the highest grade with a percentage of 100% of the 200 samples. In accordance with the theory which states that glandular atrophy often occurs in atrophic gastritis, while in this study the dominant type of gastritis was chemical gastritis / gastrophaty.

The most common grade of intestinal metaplasia was 0 or normal, with a percentage of 90.4% of cases in the antrum area and 93.0% in the corpus area. Similar to the research of Nurdin et al., The most common grade is 0 or normal with a percentage of 90.4% in the antrum area and 97% in the corpus area. [3] Ariefiany et al stated that the highest grade is 0 or normal. [17] Husein et al also obtained the same results, with the highest grade being grade 0. [10] Abdil et al who stated that the highest grade was 0 with 321 cases in the corpus area and 315 cases in the antrum area out of 328 cases. [24] In this study there were still many normal glands found in most samples and also because there was no special staining, for mucin can increase the diagnostic rate of instestinal metaplastic. Determination of the biospi region, namely incisura angularis, also has an added value in detecting intestinal metaplasia. [17,24]

The highest grade *H. pylori* was grade 0 with a percentage of 97.4% in the antrum area and 100% in the corpus area. Similar to the study by Nurdin et al, that *H. pylori* was not found in 162 cases out of 166 cases. [3] Ariefiany et al stated that *H. pylori* was not found in 20 of 42 cases with a percentage of 47.6%. [10] Similar to Daniel and Mario, *H. pylori* was not found in 173 cases out of 200 cases. These results were obtained because *H. pylori* is difficult to see by H&E staining if the amount is small which is a weakness of this study, or because the patient has undergone treatment so that the bacterial infection is reduced or no longer visible due to the drug that has been given. [17,23]

Atrophy stage assessment using the Olga system in this study the most commonly found was stage 0 or normal with a percentage of 78.1%. Similar to the research results, Nurdin et al stated that the highest proportion was stage 0 with a percentage of 90.4% of cases. [3] Naimovna et al, stated that the most stage 0 in the corpus and stage 2 in the antrum with a percentage of cases 55% and 38.3%. [25]

Conclusion

In this study, there were 114 cases of chronic gastritis, consisting of 69 cases of men and 45 cases of women. The most age range was 51-60 years and the lowest was > 70 years. The tribe that is mostly found in the Batak tribe is 29 cases. In the Sydney system classification, the most common histomorphologies at the antrum and corpus sites are grade 1 for MN inflammation, grade 0 for PMN activity, grade 0 for gland atrophy, grade 0 for intestinal metaplasia, and grade 0 *H. pylori*. Atrophy assessment is performed to assess the risk of gastric cancer in chronic gastritis. Although the Olga system aims to categorize cancer risk and has been used for more than 10 years, there is still little research on the use of the Olga system in the history of gastric cancer.

COMPETING INTERESTS

The author has no financial interests that are relevant to the products or company described in this article.

ACKNOWLEDGEMENT

We acknowledge to all staff and resident of Anatomical Pathology Department of North Sumatra University, H.AdamMalik hospital, Medan, Indonesia for all its help and cooperation.

ETHICAL APROVAL

The Health Research Ethical Committee, Universitas Sumatera Utara , Medan, Indonesia approved this study.

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