

## Retrospective Study

# Clinical features of gastroesophageal reflux disease and erosive esophagitis: Insights from patients undergoing esophagogastroduodenoscopy in resource-limited Ethiopia

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**Specialty type:** Gastroenterology and hepatology**Provenance and peer review:** Unsolicited article; Externally peer reviewed.**Peer-review model:** Single blind**Peer-review report's classification****Scientific Quality:** Grade B, Grade B**Novelty:** Grade A, Grade B**Creativity or Innovation:** Grade B, Grade B**Scientific Significance:** Grade A, Grade C**P-Reviewer:** Kolasinski NT; Lv L**Received:** May 22, 2024**Revised:** August 24, 2024**Accepted:** August 30, 2024**Published online:** September 14, 2024**Processing time:** 110 Days and 10.6 Hours**Firehiwot A Mengistie, Abate B Shewaye, Abel T Tasamma, Zekarias S Ayalew**, Department of Internal Medicine, Addis Ababa University, Addis Ababa 1176, Addis Ababa, Ethiopia**Firehiwot A Mengistie**, Department of Internal Medicine, Rheum Rheumatology and Internal Medicine Specialty Clinic, Addis Ababa 1000, Addis Ababa, Ethiopia**Abate B Shewaye**, Division of Gastroenterology and Hepatology, Department of Internal Medicine, Adera Medical and Surgical Center, Addis Ababa 1000, Addis Ababa, Ethiopia**Co-corresponding authors:** Firehiwot A Mengistie and Zekarias S Ayalew.**Corresponding author:** Firehiwot A Mengistie, MD, Chief Physician, Department of Internal Medicine, Addis Ababa University, Churchill St., Addis Ababa 1176, Addis Ababa, Ethiopia. [firehiwotabebe671@gmail.com](mailto:firehiwotabebe671@gmail.com)

## Abstract

### BACKGROUND

Gastroesophageal reflux disease (GERD) is a common disease worldwide with varying clinical presentations and risk factors. Prevalence data for Africa is lacking, but an increasing trend is expected due to demographic and epidemiological transitions. Although endoscopic studies for general gastrointestinal disorders have shown some patients with erosive esophagitis (EE), no studies in Ethiopia have investigated the clinical characteristics, risk factors, and severity of GERD using esophagogastroduodenoscopy (EGD).

### AIM

To assess the clinical features of GERD in Ethiopian patients who underwent EGD and determine the severity and risk factors of EE.

### METHODS

We conducted a multicenter, retrospective cross-sectional study of 221 patients diagnosed with GERD and endoscopic findings of EE at Trauma Associated Severe Hemorrhage and Amniotic Membrane Stem Cell between January 2019 and August 2022. Data were collected from electronic medical records and phone call interviews. We used descriptive statistics and binary logistic regression analysis with SPSS version 26 to identify the association between variables with a

statistical significance set at  $P$  value  $< 0.05$ .

## RESULTS

The mean  $\pm$  SD age of the patients was 44.8 ( $\pm$  15.9) years, with a male-to-female ratio of 1.6:1. The most commonly reported symptom was epigastric pain (80.5%), followed by heartburn (43%). Los Angeles (LA)-A EE was diagnosed in 71.1% of patients, followed by LA-B (14.9%), LA-C (7.7%), and LA-D (5.9%). Multivariate analysis showed that age 50 or above, presence of bleeding, and endoscopic findings of duodenitis/duodenopathy were significantly associated with severe EE ( $P < 0.05$ ). Stricture and Barrett's esophagus were observed in 4.5% and 1.36% of patients with EE, respectively.

## CONCLUSION

Most of the patients had milder EE with fewer complications. However, severe EE was more prevalent in older patients and those with duodenitis/duodenopathy.

**Key Words:** Gastroesophageal reflux disease; Erosive esophagitis; Hiatal hernia; Esophagogastroduodenoscopy; Heart burn

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**Core Tip:** This multicenter study in a resource-limited setting identified risk factors for severe erosive esophagitis (EE) in patients with gastroesophageal reflux disease (GERD) undergoing esophagogastroduodenoscopy. Age 50 years or above, bleeding, and duodenitis/duodenopathy were associated with worse EE. These findings can inform risk stratification for patients with GERD in similar settings.

**Citation:** Mengistie FA, Shewaye AB, Tasamma AT, Ayalew ZS. Clinical features of gastroesophageal reflux disease and erosive esophagitis: Insights from patients undergoing esophagogastroduodenoscopy in resource-limited Ethiopia. *World J Gastroenterol* 2024; 30(34): 3883-3893

**URL:** <https://www.wjgnet.com/1007-9327/full/v30/i34/3883.htm>

**DOI:** <https://dx.doi.org/10.3748/wjg.v30.i34.3883>

## INTRODUCTION

Gastroesophageal reflux disease (GERD) is a multifactorial process producing symptoms of heartburn and acid regurgitation, which occurs due to failure of the normal anti-reflux barrier[1-4]. It is diagnosed symptomatically by the occurrence of heartburn 2 or more days a week[5]. Most patients have no visible mucosal damage during endoscopy, whereas others have esophagitis, peptic strictures, or Barrett's esophagus (BE)[6-8]. The sensitivity of endoscopy for GERD is low, but it has high specificity at 90%-95%[9].

Accurate prevalence rates for GERD are difficult to ascertain with precision because many affected individuals, even those with BE, have no symptoms. Furthermore, data based on objective tests such as endoscopy and esophageal pH testing are impractical in extensive screening[10]. The pooled prevalence of at least weekly GERD symptoms reported from population-based studies worldwide is approximately 13%, but there is considerable geographic variation[11]. In 2009, there were 8.9 million outpatient clinic visits for GERD in the United States, which was the leading diagnosis for all gastrointestinal (GI) disorders[12].

No prevalence data from Africa are available, although it is believed to increase due to demographic and epidemiological transitions. The prevalence of GERD from endoscopic data of Ethiopian patients who underwent esophagogastroduodenoscopy (EGD) for dyspeptic symptoms was 2.3% in a study published in 2004[13] and 16.4% in a study done at St. Paul Hospital during 2013-2015[14].

There are several well-recognized risk factors for GERD and its complications[15]. There is no gender difference in Western society, but women are more symptomatic in the Middle East and South America[11]. Risk of erosive esophagitis (EE), BE, and adenocarcinoma is greater in men than in women[16]. Old age is strongly associated with complications of GERD[11]. In the United States, there is a similar prevalence of GERD symptoms among different races, but whites are at a greater risk for EE, BE, and adenocarcinoma of the esophagus[16].

The risk factors and the clinical profile of patients with GERD are variable and unknown in Africa. Furthermore, there is no data in Ethiopia from a study done in patients with GERD. Therefore, this study aims to assess the clinical features of GERD in Ethiopian patients who underwent EGD, determine the incidence and severity of EE in this population, and assess EE-related risk factors and comorbidities.

## MATERIALS AND METHODS

### Study design

A retrospective cross-sectional study was conducted in Tikur Anbesa specialized hospital (TASH) score and Adera medical and surgical center (AMSC) from August 2022 to October 2022, using the electronic medical records (EMR) registry, phone call interviews, and endoscopic Health Management Information Systems (HMIS) data registered between January 2019 and August 2022. All adult patients (> 18 years) who underwent EGD and were diagnosed with EE during the study period at both centers were included in the study. Patients with incomplete data, gastric outlet obstruction, gastric cancer, and esophageal cancer were excluded.

### Study procedure

A structured questionnaire adopted and modified from different literature addressing similar objectives was prepared ([Supplementary material](#)). The questionnaire comprised three sections. The first focused on demographic information and risk factors for GERD, encompassing age, gender, residence, education, occupation, marital status, religion, comorbidities, body mass index (BMI), family history, lifestyle habits, medication use, and GERD-related factors. The second delved into disease characterization, such as symptoms, alarm signs, complications such as bleeding and ulcers, and laboratory results like complete blood count and *Helicobacter pylori* (*H. pylori*) stool test. The third was dedicated to endoscopic findings. Patient medical record numbers were taken from the endoscopic HMIS registry, and the EMR registry of each patient with EE was reviewed. After eligibility was checked, the data was registered. After briefly explaining the aim of the research and obtaining phone consent, phone call interviews were used to collect further data not found in the EMR registries.

### Sampling procedures

All patients who were eligible during the study period were included. Given the descriptive nature of our study, we didn't calculate the sample size to include all corner samples of patients. Increasing the study's sample size gives more power to detect actual effects, provide more accurate and stable estimates, and generalize findings to a broader population during the regression analysis.

### Statistical analysis

After verifying, completing, and checking data for quality, it was entered into SPSS version 26 and then analyzed. Results were summarized using tables and figures. Categorical variables were expressed as frequencies and percentages. Means, SD, and minimum and maximum values were used to express continuous variables. Independent variables were noncollinear after checking for multicollinearity using variance inflation factor (VIF). Univariate analysis was assessed using logistic regression for each independent variable with endoscopic severity of EE. Multivariate analysis was then assessed using binary logistic regression to determine the association of independent variables with the severity of EE. A *P* value less than 0.05 is considered statistically significant, and an odds ratio with a 95% confidence interval (95%CI) is used to determine the presence, strength, and direction of association between covariates and the dependent variable.

## RESULTS

During the study period, 335 endoscopic records were reviewed (101 at TASH and 234 at AMSC). Among them, 221 (66%) met the inclusion criteria and were included in the analysis ([Figure 1](#)).

### Sociodemographic profiles

The mean  $\pm$  SD age of the participants was  $44.8 \pm 15.9$  with a wide range (18-89 years). Most participants (37.6%) fell within the 30-44-year age range, whereas the least represented group was young adults aged 18-29 years (17.6%). Nearly a quarter of patients were between age group 45 and 59 years, and 19% of the participants were 60 years or older. The study was male predominant (62%), and most were married (70%). Almost all participants (95%) lived in urban areas, and a significant portion (72.4%) resided in Addis Ababa.

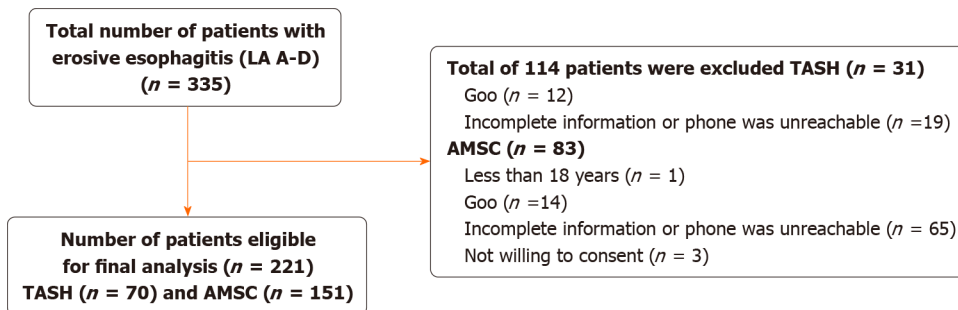
### Risk factors of GERD

Nearly half of patients had a normal BMI (51.6%), whereas 75% fell within the overweight range (BMI 24.9-29.9). Only 8.6% of patients were obese (BMI > 30). Two patients reported worsening of symptoms and diagnosis during the time of pregnancy. One patient had a history of myotomy for achalasia. A family history of similar symptoms was reported by 17.6% of the patients. A total of 18 patients reported the use of traditional herbs recent or remote from their symptom onset. Eleven (5%) were current smokers, and eight (3.6%) had a previous smoking history. Moreover, 22.2% of patients reported occasional alcohol consumption, whereas 12.7% consumed more than one drink per week. The most common drug reported was calcium channel blocker, taken by patients with hypertension (HTN) and scleroderma. Aspirin or nonsteroidal anti-inflammatory drug (NSAID) use was reported in 5.9% of patients. Regarding the dietary pattern of patients, spicy food, the local spice Berbere, was the most commonly consumed item, followed by coffee, meat, and fatty foods ([Figure 2](#)). [Table 1](#) summarizes the risk factors of GERD.

**Table 1 Risk factors of patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period**

Risk factors		Number (n)	Percentage (%)
BMI	Less than 18.5	13/221	5.9
	18.5-24.9	114/221	51.6
	24.9-29.9	75/221	33.9
	30 and above	19/221	8.6
Risk factor history	Family history present	39/221	17.6
	Symptoms during pregnancy	2/84	2.4
	Traditional herb use	18/221	8.1
	Myotomy for Achalasia	1/221	0.5
Smoking	Current smoker	11/221	5%
	Ex-smoker	8/221	3.6
Alcohol	Occasional	49/221	22.2
	More than 1 drink/week	28/221	12.7
Drug history	CCB	27/221	12.2
	Aspirin/NSAID	13/221	5.9
	Prednisolone	4/221	1.8
	Metformin	4/221	1.8
	Iron	2/221	0.9

BMI: Body mass index; CCB: Calcium channel blocker; NSAID: Nonsteroidal anti-inflammatory drug.



**Figure 1 Patient selection flow chart.** LA: Los Angeles; TASH: Tikur Anbesa specialized hospital; AMSC: Adera medical and surgical center; GOO: Gastric outlet obstruction.

**Comorbidities of GERD**

HTN was the most prevalent comorbidity, affecting 12% of the patients, followed by irritable bowel syndrome (IBS; 9%) and diabetes mellitus (DM; 6.8%). Among GERD-specific comorbidities, 15 patients (6.8%) had suspected or proven laryngopharyngeal reflux, 3 had scleroderma, and none had Zollinger-Ellison syndrome. Table 2 summarizes the comorbidities of patients with GERD.

**Clinical characteristics**

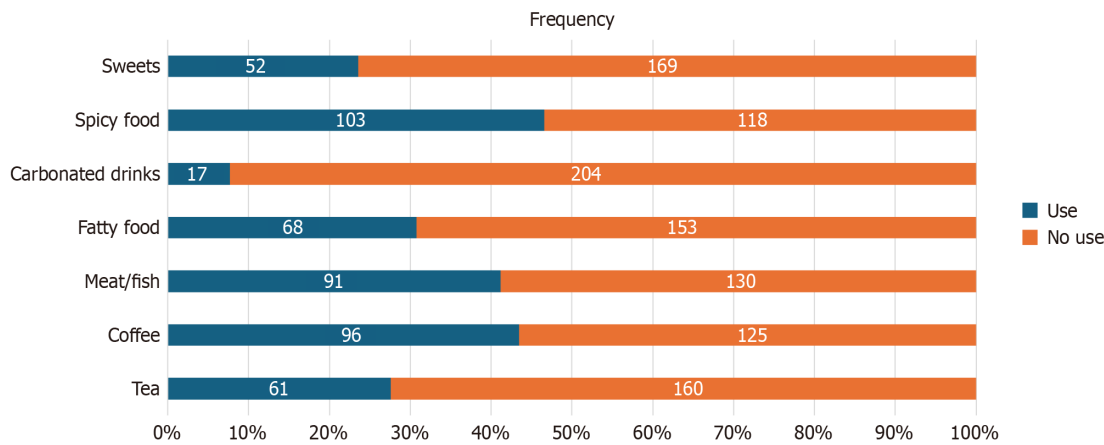
Typical reflux symptoms such as heartburn, regurgitation, and water brash were reported in less than half of the patients (45.7%). The most commonly reported symptom overall was epigastric burning pain (80.5%), followed by heartburn (43%) and intermittent or persistent vomiting in 28.9% of patients. Cough and pharyngeal pain were the most reported extraintestinal atypical symptoms, each accounting for 9%. Chest pain and globus were reported in 11 (5%) of patients each. Among the alarm features, 26.7% of patients reported mild to significant weight loss, 14.5% had hematemesis or melena, 7.2% had dysphagia, and 6.6% had anemia.

Twenty-three percent of patients reported long-standing symptoms lasting more than 2 years before undergoing endoscopy. Most (33.9%) had symptoms lasting between 6 months and 2 years. Of 221 patients, 155 tested for *H. pylori*

**Table 2** Co-morbidities of patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period

Co-morbidities	Number (n)	Percentage (%)
Diabetes mellitus	15/221	6.8
HTN	28/221	12.7
NAFLD	7/221	3.2
Dyslipidemia	13/221	5.9
CLD/PHTN	14/221	6.3
Asthma	4/221	1.8
IBS	20/221	9
Cholelithiasis	7/221	3.2
Scleroderma	3/221	1.4
Laryngopharyngeal Reflux	15/221	6.8

HTN: Hypertension; NAFLD: Nonalcoholic fatty liver disease; CLD: Chronic liver disease; PHTN: Portal hypertension; IBS: Irritable bowel syndrome.



**Figure 2** The dietary patterns of patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center were reported during the study period.

using a stool antigen test. Of those tested, 121 (78%) received negative results. Table 3 and Figure 3 summarize the clinical characteristics of patients and the frequency of specific GERD symptoms, respectively.

**Endoscopic characteristics**

Dyspeptic symptoms not responding to proton pump inhibitors with or without alarm features were the most common indication for EGD (69.2%), followed by reflux symptoms (32.6). EGD was done without significant symptoms for another purpose (esophageal varices screening in eight patients) and found to have EE. Los Angeles (LA) used to grade EE. Most (71.5%) patients had LA-A, followed by LA-B (14.9%). The remaining had severe esophagitis: 7.7% LA-C and 5.9% LA-D. Moreover, 45.7% had hiatal hernia (HH). Barrett’s appearing mucosa was seen in 3 out of 221 patients (one reported as a short segment, the second C1M2, and the third C3M2). Histologic confirmation was available for the patient with C1M2. There was no report of eosinophilic esophagitis. Concomitant gastric and duodenal ulcers were found in 4.1% and 11.3% of patients, respectively. Duodenopathy and gastropathy, visual diagnoses that are not histologically confirmed, were observed in 10% and 31.7% of patients, respectively. In addition, 5.9% of patients had bile acid gastropathy. Stricture, a complication of GERD, was identified in 4.5% of patients. Other complications were not reported (Table 4).

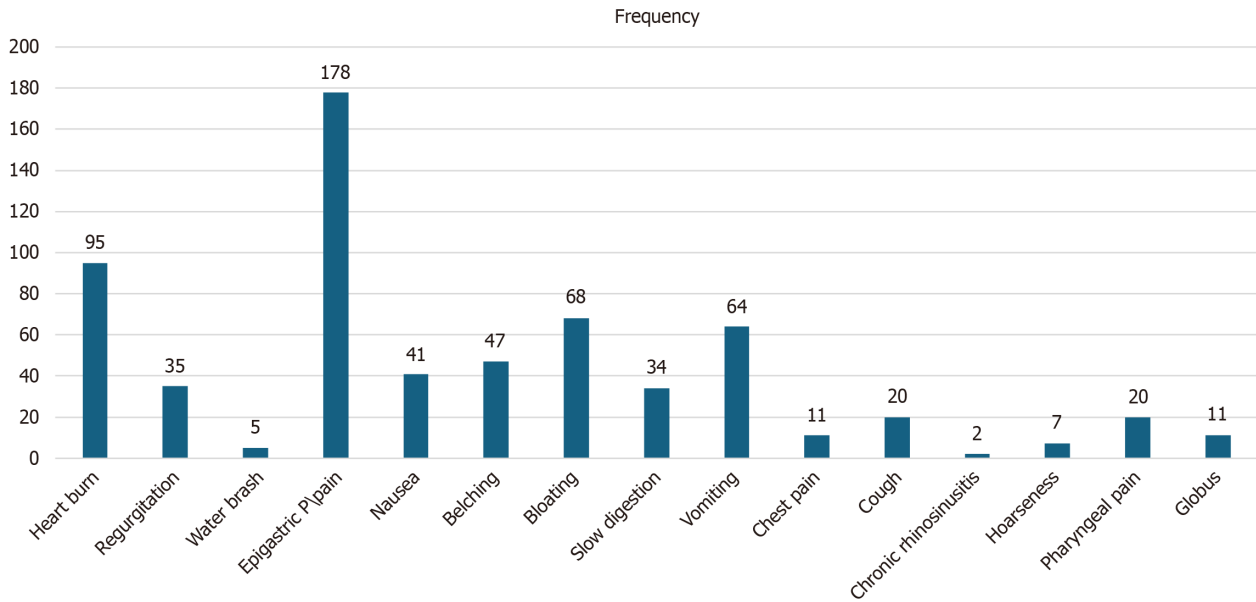
**Factors associated with the severity of EE**

Multicollinearity was checked using the VIF. Binary logistic regression was used to assess potential factors associated with severe EE (P value < 0.25), revealing 11 potential factors: Age over 50 years, presence DM, use of NSAIDs, absence of typical symptoms, presence of bleeding, a negative *H. pylori* stool antigen test, presence of bile reflux gastropathy, presence of a duodenal ulcer, presence of duodenopathy/duodenitis, absence of antral gastritis/gastropathy, and absence

**Table 3 Clinical characteristics of patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period**

Clinical characteristics	Number (n)	Percentage (%)	
Typical symptoms	101/221	45.7	
Atypical intestinal symptoms	202/221	91.4	
Atypical extra intestinal symptoms	50/221	22.6	
Alarm features	Loss of appetite	35/221	15.8
	Weight loss	59/221	26.7
	Dysphagia	16/221	7.2
	Odynophagia	3/221	1.4
	Anemia	12/181	6.6
	UGIB	32/221	14.5
	Duration of symptoms	Less than three months	43/221
3-6months		52/221	23.5
Six months to 2 years		75/221	33.9
More than two years		51/221	23.1
<i>Helicobacter pylori</i> stool antigen	Not done	66/221	29.9
	Negative	121/221	54.8
	Positive	34/221	15.4

UGIB: Upper gastrointestinal bleeding.



**Figure 3 Specific symptoms reported by patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period.**

of pangastritis/gastritis. A multivariate logistic regression analysis was then conducted using all variables except the *H. pylori* test, which was excluded due to missing data. Only three variables had statistically significant associations with the severity of EE (*P* value < 0.05). Patients aged 50 years and above had a more than twofold increased risk of severe EE compared with younger patients. In addition, presentation with upper gastrointestinal bleeding (UGIB) increased the risk of severe esophagitis by 2.6 times. Finally, having duodenopathy as a comorbidity was associated with a 3.5-fold greater likelihood of severe EE grades (Table 5).

**Table 4 Endoscopic characteristics of patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period**

Endoscopic findings		Frequency (n)	Percentage (%)
HH		101/221	45.7
Erosive esophagitis	LA-A	158/221	71.5
	LA-B	33/221	14.9
	LA-C	17/221	7.7
	LA-D	13/221	5.9
Barrett's esophagus		3/221	1.4
Gastric ulcer		9/221	4.1
Duodenal ulcer		25/221	11.3
Stricture		10/221	4.5
Gastropathy/gastritis		70/221	31.7
	Pan gastropathy	12/70	
	Antral gastropathy	58/70	
Bile reflux gastropathy		13/221	5.9
Duodenopathy/duodenitis		22/221	10
Others	Portal hypertensive gastropathy	4/221	1.8
	Grade 1 EV	3/221	1.4
	GAVE	1/221	0.5
	Gastric polyp	2/221	0.9

HH: Hiatal hernia; LA: Los Angeles; EV: Esophageal varices; GAVE: Gastric antral vascular ectasia.

## DISCUSSION

This study aimed to assess the clinical features, complications, and risk factors for GERD and the severity of EE in Ethiopian patients. It was found that 71.5% had LA-A EE and a large proportion (91.4%) of patients presented with atypical symptoms. Age, the presence of UGIB, and the presence of duodenopathy/duodenitis were significantly associated with the severity of EE. The mean age of our patients (44.8 years) was similar to an Egyptian study[17] and younger than patients in the study from China (58.6 years)[18]. The male-to-female ratio was 1.6:1, consistent with most studies showing male predominance[17-19].

In our study, 45.7% of patients reported typical reflux symptoms such as heartburn, regurgitation, and water brash. Epigastric burning pain was the most prevalent symptom, affecting around 80.5% of patients. It suggests that patients might not consider typical reflux symptoms as significant indicators of GERD. This finding aligns with a Vietnamese study where epigastric pain and regurgitation were the most common complaints. In contrast to our study, only 9.2% of patients in the Vietnamese study reported that heartburn was their primary complaint. This difference could be due to the difficulty of expressing heartburn in most Asian languages[20]. A possible explanation for the predominance of epigastric burning pain in our study could be the high prevalence of overlapping diagnoses such as gastritis, duodenitis, or ulcer disease.

Consistent with prior studies, we found that older age (> 50 years) was significantly associated with the severity of EE [adjusted odds ratio (AOR): 2.331, 95%CI: 1.169-4.649,  $P = 0.016$ ][11,21-23]. Similarly, UGIB was a significant risk factor for severe EE (AOR: 2.603, 95%CI: 1.111-6.098,  $P = 0.028$ ). This finding aligns with a study from the United Kingdom[22]. However, UGIB can have other causes besides GERD. Our study found a high prevalence of overlapping diagnoses that can cause GI bleeding, such as duodenal ulcer and duodenitis/duodenopathy. These findings align with the Scottish study, which showed an overlapping duodenal ulcer and EE diagnosis[24]. However, only duodenitis/duodenopathy was associated with the severity of EE (AOR: 3.517 [1.259-9.824],  $P = 0.016$ ). Bile acid reflux gastropathy (BRG) was found in 5.9% of our patients, but it was not related to severe EE. These findings contrast with the study in Greece, which showed an association between BRG and severe grades of esophagitis[25].

Several studies have reported a positive association between obesity and reflux esophagitis[15,18,20]. However, few have specifically investigated the link between obesity and the severity of esophageal inflammation. Our study did not find a significant association between BMI and EE severity. This finding aligns with the Loiano-Monghidoro study[26]. An American study demonstrated that LA-D patients had a lower BMI than LA-A patients[27]. However, El-Serag and Johanson[28] found that obesity was an independent risk factor for severe esophagitis. The lack of association in our

**Table 5** Factors associated with the severity of erosive esophagitis in patients with erosive esophagitis at Tikur Anbesa specialized hospital and Adera medical and surgical center during the study period

Variables	Severity of EE					
	LA-A	LA-B/C/D	COR (95%CI)	P value	AOR (95%CI)	P value
Age of the study participants						
Less than 50	107	32	1			
50 and above	51	31	2.032 (1.12-3.689)	0.02	2.331 (1.169-4.649)	0.016 <sup>a</sup>
Diabetes mellitus						
None	150	56	1			
Present	8	7	2.344 (0.812-6.764)	0.115	1.826 (0.455-7.330)	0.396
NSAID use						
None	152	56	1			
Present	6	7	3.167 (1.020-9.829)	0.046	1.681 (0.409-6.915)	0.472
Typical symptoms						
None	80	40	1.696 (0.93-3.091)	0.085	1.800 (0.909-3.563)	0.092
Present	78	23	1			
UGIB						
None	141	48	1			
Present	17	15	2.592 (1.203-5.585)	0.015	2.603 (1.111-6.098)	0.028 <sup>a</sup>
<i>Helicobacter pylori</i> antigen						
Positive	29	5	1		-	-
Negative	88	33	2.175 (0.777-6.092)	0.139	-	-
Bile acid gastropathy						
None	151	57	1			
Present	7	6	2.271 (0.732-7.045)	0.156	1.812 (0.521-6.299)	0.350
Duodenal ulcer						
None	145	51	1			
Present	13	12	2.624 (1.125-6.122)	0.026	2.405 (0.918-6.301)	0.074
Duodenopathy/duodenitis						
None	147	52	1			
Present	11	11	2.827 (1.157-6.908)	0.023	3.517 (1.259-9.824)	0.016 <sup>a</sup>
Antral gastritis/gastropathy						
None	111	52	2.002 (0.960-4.172)	0.064	2.229 (0.997-4.986)	0.051
Present	47	11	1			
Pan gastritis/gastropathy						
None	147	62	4.639 (0.586-36.712)	0.146	8.256 (0.967- 70.531)	0.054
Present	11	1	1			

<sup>a</sup>P < 0.05, and it is statistically significant.

EE: Erosive esophagitis; COR: Common odds ratio; AOR: Adjusted odds ratio; 95%CI: 95% confidence interval; LA: Los Angeles; NSAID: Nonsteroidal anti-inflammatory drug; UGIB: Upper gastrointestinal bleeding.



study might be due to its relatively small sample size and the predominance of patients with normal BMI and milder disease.

In our study, 12% of patients had HTN, 6.8% had type 2 DM, 3.2% had nonalcoholic fatty liver disease, and 5.9% had dyslipidemia. Although a Korean study showed an association between metabolic syndrome and the development and severity of EE[29], our study did not find an association, possibly due to the smaller proportion of patients with DM, HTN, and dyslipidemia in our cohort. We observed a lower prevalence of concurrent IBS (9%) compared with the Nigerian study, which reported an overlap of GERD with dyspepsia and/or IBS in over 50% of cases[30].

Aspirin or NSAID use was reported in 5.9% of patients and was not associated with the severity of EE. The global GERD prevalence meta-analysis identified that aspirin was a risk factor[15], and one-third of patients in the Egyptian study reported NSAID use[17]. It is one of the predictors of EE[31].

*H. pylori* stool antigen testing was positive in 22% of tested patients. Univariate analysis suggested a link between *H. pylori* negativity and severe EE, aligning with Vietnamese and Iranian studies showing an increased risk in this population[20,32,33]. Due to incomplete *H. pylori* testing, we could not conduct a multivariate analysis to confirm the suggested negative association.

In contrast to our findings, many studies have reported that smoking was a risk factor for EE[17,20,28]. However, the low proportion of active smokers (5%) in our study limited our ability to detect associations with EE severity. Alcohol is associated with EE diagnosis, but only a few studies have explored its link with the severity of EE. Even an American study found an inverse relationship between the severity of EE and alcohol use[27]. In our study, 22.2% of patients reported occasional alcohol consumption, whereas 12.7% consumed more than one drink per week. Neither frequency of alcohol intake showed a significant association with the severity of EE.

Endoscopy revealed HH in 45.7% of our patients. The prevalence in our patient population was higher compared to a study comparing African American and non-Hispanic whites[34]. Contrary to some prior studies, we did not find an association between HH and the severity of EE[15,17,20,26]. Interestingly, HH was present in similar proportions across all EE severity groups in our study. Strictures occurred in ten patients (4.5%), which was lower than what is mentioned in the literature (7% to 23%)[35]. BE was identified in only 1.36% of our patients, consistent with the lower prevalence observed in Black populations[36]. The prevalence of BE is lowest in African American females compared to other race [37].

### Strengths and weakness of the study

This study investigated a prevalent health issue in Ethiopia and aimed to generate new data that were not previously explored. To overcome the limitations of a retrospective design, phone interviews were conducted to gather additional information. Including multiple hospitals strengthens the generalizability of the findings within a hospital setting. Enrolling participants through EGD ensured a high degree of diagnostic accuracy for GERD.

However, the study is limited by a relatively small sample size, particularly in one group, and this could affect the detection of associations between factors and disease severity. In addition, missing data on *H. pylori* infection limited its inclusion in the analysis. As a hospital-based study, the generalizability to the entire population is restricted. Furthermore, the study only focused on a specific group of patients with GERD and the retrospective design limited control over confounding factors.

## CONCLUSION

Our study of Ethiopian patients with GERD who underwent EGD provided population-specific insights into the clinical features of GERD, the association of GERD with EE, and risk factors for EE in patients with GERD. Notably, a large portion of these patients presented with atypical symptoms of GERD, most commonly burning epigastric pain. The mean age of Ethiopian patients with GERD and EE was 44.8 years, with a predominance of LA-A EE. However, over half of patients with EE did not report reflux symptoms as their primary complaint. Only older age, a history of UGIB, and duodenitis/duodenopathy had significant association with severe EE. The prevalence of complications associated with EE was lower in our patient population.

## ACKNOWLEDGEMENTS

We would like to thank the staffs of the Gastroenterology units at TASH and AMSC for their collaboration during this study.

## FOOTNOTES

**Author contributions:** Mengistie FA and Ayalew ZS contribute equally to this study as co-corresponding authors. Mengistie FA and Shewaye AB contribute to the conceptualization, methodology, investigation, analysis, and writing of the manuscript; Tasamma AT and Ayalew ZS contribute to the methodology, data curation, drafting, interpretation, and edition of the data and supervision, supervision, and edition of the manuscript.

**Institutional review board statement:** The ethical clearance of the study was obtained from the Institutional Review Board of Addis Ababa

University, College of Health Sciences.

**Informed consent statement:** Consent forms have been acquired from all participants.

**Conflict-of-interest statement:** All the authors report no relevant conflicts of interest for this article.

**Data sharing statement:** The dataset is available from the corresponding author upon request.

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**S-Editor:** Lin C

**L-Editor:** A

**P-Editor:** Zheng XM

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