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ENDOSCOPICAL AND HISTOPATHOLOGICAL ASSESSMENT OF ESOPHAGEAL BIOPSIES IN PATIENTS WITH GASTROESOPHAGEAL REFLUX DISEASE

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ABSTRACT

Background: Gastroesophageal reflux disease is a chronic digestive condition that affects the lower esophageal sphincter causing the stomach content to back up from the stomach into the esophagus. It is a common disease with a prevalence of 8%-33% involving all age groups and both genders. **Aim**: To assess clinical, endoscopic, and histopathological features of esophageal biopsies in patients with Gastroesophageal reflux disease. **Method:** A retrospective study including analysis of 100 randomly selected patients with Gastroesophageal reflux disease collected from Teaching Laboratories of Al-Emamain Al-Kadhmain Medical City (AS), Baghdad Medical City and private labs in Baghdad, Iraq, reported between October 2020 to January 2022. The age, gender, clinical presentation, endoscopic and microscopical findings were studied. **Results:** The mean age of patients in this study was (47.37 years ± 12.13 SD), 64.0% of cases were males and 36% of cases were females. Regarding chief complaint at presentation, 31.0% of cases presented with heartburn, 20.0% with dysphagia, 16% with dyspepsia, 22% with epigastric pain, 9% with vomiting, 1% with melena, and 1% with regurgitation. Regarding endoscopic findings, 23% had esophageal thickening, 19% had esophageal ulceration, 6% had thick ulcerated esophageal lumen, 9% had esophageal polyp, 10% had esophageal erosion, 7% had erythematous esophageal lesion, 11% had esophageal nodule, 7% had esophageal mass, 5% had normal mucosa, 2% had esophageal stricture, and 1% had circular esophageal folds. Regarding microscopic findings, 11.0% of cases showed Barrett's esophagus without dysplasia, 4% showed Barrett's esophagus with low grade dysplasia, 3% showed Barrett's esophagus with high grade dysplasia, 70% showed reflux esophagitis, 6% showed inflammatory polyps, 5% showed adenocarcinoma, and 1% showed gastric heterotopia. **Conclusion:** Gastroesophageal reflux disease is a common condition with male predominance and increased risk for complications by age including Barrett's esophagus and esophageal adenocarcinoma, the most common presentation was heartburn, the most common endoscopic finding was esophageal wall thickening, and the most common microscopical finding was reflux esophagitis.

KEYWORDS: Gastroesophageal reflux disease (GERD), Barrett's esophagus (BE), esophageal adenocarcinoma (EAC), Reflux esophagitis (RE).

INTRODUCTION

Over the past several years, healthcare professionals have become increasingly interested in gastroesophageal reflux disease (GERD), which is defined as a condition that develops when the reflux of stomach contents causes troublesome symptoms and/or complications.[1]

It is characterized by tissue damage that results from excessive esophageal acid exposure attributable to anatomical or physiological defects of the esophagogastric junction (EGJ) and esophageal peristalsis.[2]

The two most frequently reported symptoms of GERD are heartburn, which can be described as a burning discomfort that begins behind the sternum and radiates to the neck and throat, and acid regurgitation, which is characterized as a bitter, sour tasting fluid.[3]

Some patients may present with atypical symptoms such as cough, asthma, laryngitis, or chest pain, and other patients with GERD experience no symptoms at all.[4]

GERD symptoms, however, have multiple potential determinants including the number of reflux episodes, the proximal extent to which the refluxate migrates, the

acidity of the refluxate, esophageal hypersensitivity and the awareness of the patient.

GERD could also occur in paediatrics age group as regurgitation and vomiting, heartburn, nausea, epigastric pain, cough and wheezing.[5]

The diagnosis of GERD is often clinical, with characteristic symptoms that improve with acid suppression. Heartburn with or without regurgitation is usually enough to suspect GERD, especially if the symptoms worsen postprandially or while lying down.[6]

Endoscopy should be considered in individuals who have symptoms indicative of a complex illness at the time of presentation (eg, dysphagia, unexplained weight loss, hematemesis) or those with multiple risk factors for Barrett's esophagus (BE), Which is a premalignant condition in which the normal stratified squamous epithelium of the distal esophagus is replaced by columnar mucosa with intestinal specialized metaplasia and thus have a malignant potential.[7]
Risk factors for BE include age above 50 years, white race, , male sex, prolonged reflux symptoms, obesity, smoking, and a family history of BE or esophageal adenocarcinoma.[8]

According to PARIS classification, endoscopic appearance of lesions in BE may point towards the lesions' potential to invade the submucosa (hence endoscopically unresectable). The updated Paris classification categorizes superficial lesions in esophagus into: protruding pedunculated (type 0–Ip), protruding sessile (0–Is), slightly elevated (0–IIa), completely flat (0–IIb), slightly depressed (0–IIc), excavated (0–III), or a mixed pattern.[9]

GERD has an estimated worldwide prevalence of 8%–33%, involves all age groups and both genders.[4]

However, fewer than 10% of GERD patients are likely to progress to a diagnosis of BE at 5 years, and only a minority of BE patients may develop EAC.[10]

The presence of Barrett esophagus increases an individual's relative risk of cancer 30 to 120 times compared with persons without BE.[11]

MATERIAL AND METHODS

A retrospective study including analysis of 100 randomly selected patients with GERD collected from Teaching Laboratories of Al-Emamain Al-Kadhmain Medical City (AS), Baghdad Medical City and private labs from October 2020 to January 2022.

Samples collected include paraffin blocks and H & E stained slides of esophageal biopsies of patients with GERD.

The data collection included.

- Age.
- Gender.
- Clinical presentation (asymptomatic, heartburn, epigastric pain, vomiting, dysphagia, ect.).
- Endoscopic findings.
- Microscopic findings.

Exclusion Criteria.

- Patients with known history of Gastrointestinal tract malignancy.
- Incomplete clinical or pathological data or endoscopy reports from referring physicians.
- Eosinophilic esophagitis.

Formalin-fixed paraffin-embedded tissue blocks were collected. Then, sections 4-6 microns stained routinely with Hematoxylin & Eosin and the diagnosis was revised by two independent pathologists. All statistical analyses were performed utilizing SPSS, version 23 and including mean, standard deviation, frequency and percentage using Yates Chi square with p. value <0.05 regarded as statistically significant.

RESULTS

Age distribution

The age of sampled cases ranged from (16-80) years with mean age of (47.37 years ± 12.13 SD). The age distribution shows 7 (7.0%) cases in the age group (10-19), 11 (11.0%) cases in the age group (20-29), 13 (13.0%) cases in the age group (30-39), 19 (19.0%) cases in the group (40-49), 23 (23.0%) cases in the age group (50-59), 16 (16.0%) cases in the group (60-69), and 10 (10.0%) cases in the age group (70-79) and 1 (1.0%) case (≥ 80); as shown in figure-1.

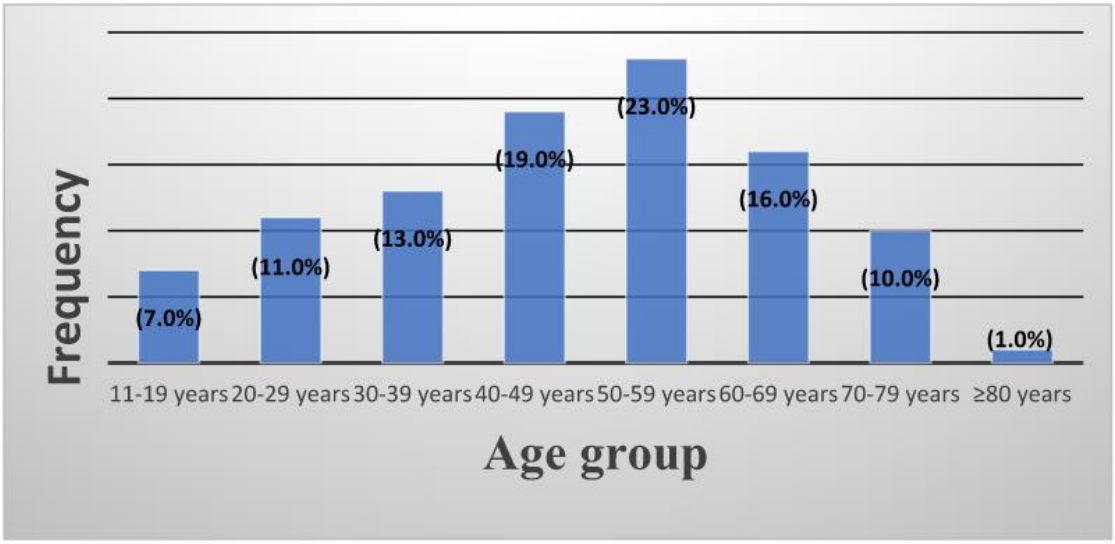

Figure-1: Distribution of cases according to age group.

Gender distribution

Regarding gender distribution, the male to female ratio was 1.7:1; as 64 (64.0%) cases were males and 36 (36.0%) cases were females; as illustrated in figure-2.

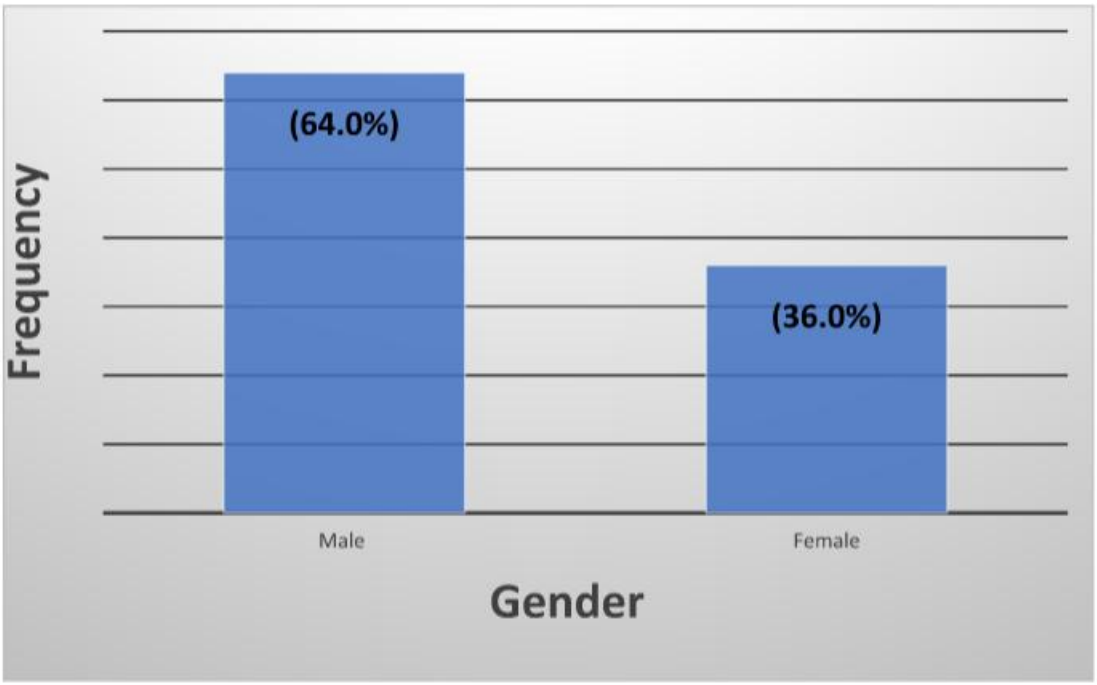

Figure 2: Gender distribution of the studied sample.

Chief complaint at presentation

Regarding chief complaint at presentation, 31 (31.0%) cases presented with heartburn, 20 (20.0%) cases with dysphagia, 16 (16.0%) cases with dyspepsia, 22 (22.0%) cases with epigastric pain, 9 (9.0%) cases with vomiting, 1 (1.0%) case with melena, and 1 (1.0%) case with regurgitation; as illustrated in the figure-3. Moreover, Among 9 patients who presented with a chief complaint of vomiting, 6 of them had hematemesis, while only 3 had non-bloody vomiting.

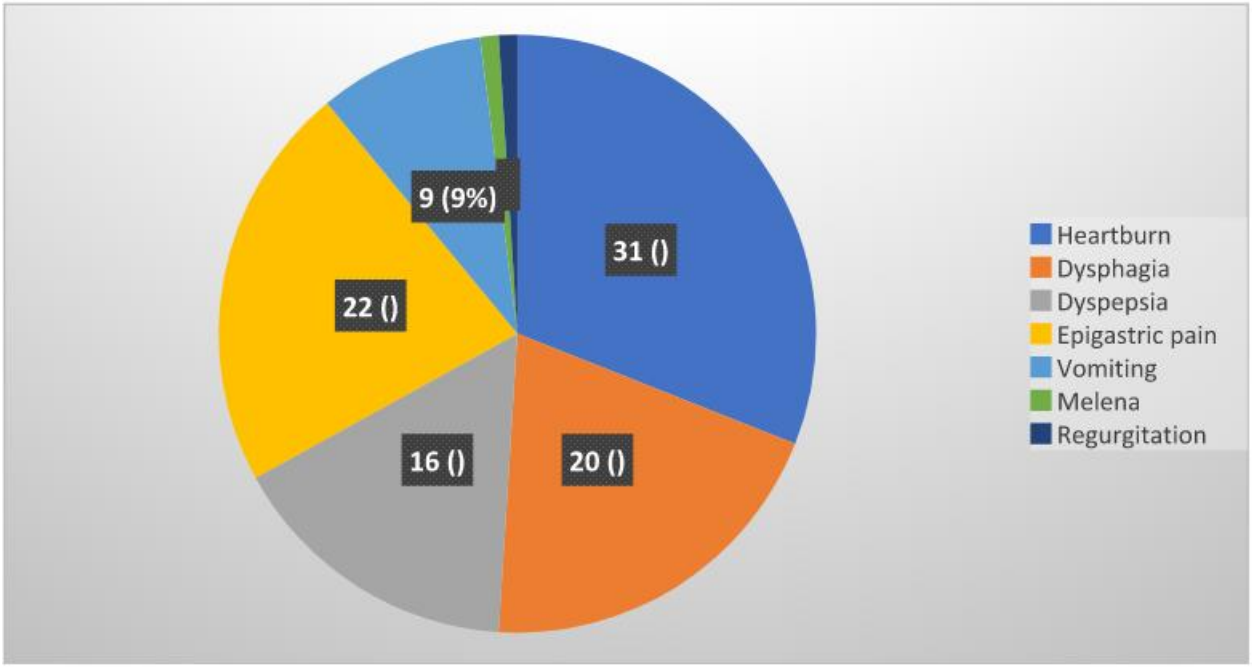

Figure 3: Chief complaint at presentation.

Endoscopic findings

Regarding endoscopic findings, 23 (23.0%) had esophageal thickening, 19 (19.0%) had esophageal ulceration, 6 (6.0%) had thick ulcerated esophageal lumen, 9 (9.0%) had esophageal polyp, 10 (10.0%) had esophageal erosion, 7 (7.0%) had erythematous esophageal lesion, 11 (11.0%) had esophageal nodule, 7 (7.0%) had esophageal mass, 5 (5.0%) had normal mucosa, 2 (2.0%) had esophageal stricture, and 1 (1.0%) had circular esophageal folds; as illustrated in the table-1. The endoscopic findings (ulceration and stricture and reddish mucosa are shown in Figure-5 and 6.

Table 1: Endoscopic findings of the studied sample.

Endoscopic findings	Number	Percentage
Esophageal thickening	23	23.0
Esophageal ulceration	19	19.0
Thick ulcerated esophageal lumen	6	6.0
Esophageal polyp	9	9.0
Esophageal erosion	10	10.0
Erythematous esophageal lesion	7	7.0
Esophageal nodule	11	11.0
Esophageal mass	7	7.0
Normal mucosa	5	5.0
Esophageal stricture	2	2.0
Circular esophageal folds	1	1.0
Total	100	100.0

Microscopic findings

Regarding microscopic findings, 11 (11.0%) cases showed Barrett's esophagus without dysplasia as shown in Figure-8, 4 (4.0%) cases showed Barrett's esophagus with low grade dysplasia as shown in Figure-9, 3 (3.0%) showed Barrett's esophagus with high grade dysplasia as shown in Figure-10, 70 (70.0%) cases showed reflux esophagitis (53 cases of them were with ulceration as shown in Figure-7, and 17 cases were without ulceration), 6 (6.0%) showed inflammatory polyps, 5 (5.0%) showed adenocarcinoma as shown in figure-11, and 1 (1.0%) showed gastric heterotopia; all illustrated in table-2. Regarding patients with Barrett's esophagus, 11 (61.1%) showed no dysplasia, 4 (22.2%) showed low grade dysplasia, and 3 (16.7%) showed high grade dysplasia; as illustrated in figure-4.

Table 2: Microscopical findings of the studied sample.

Microscopic findings	Number	Percentage
Barrett's esophagus without dysplasia	11	11.0

Barrett's esophagus with low grade dysplasia	4	4.0
Barrett's esophagus with high grade dysplasia	3	3.0
Reflux esophagitis with ulcer	53	53.0
Reflux esophagitis without ulcer	17	17.0
Inflammatory polyps	6	6.0
Adenocarcinoma	5	5.0
Gastric heterotopia with inflammation	1	1.0
Total	100	100.0

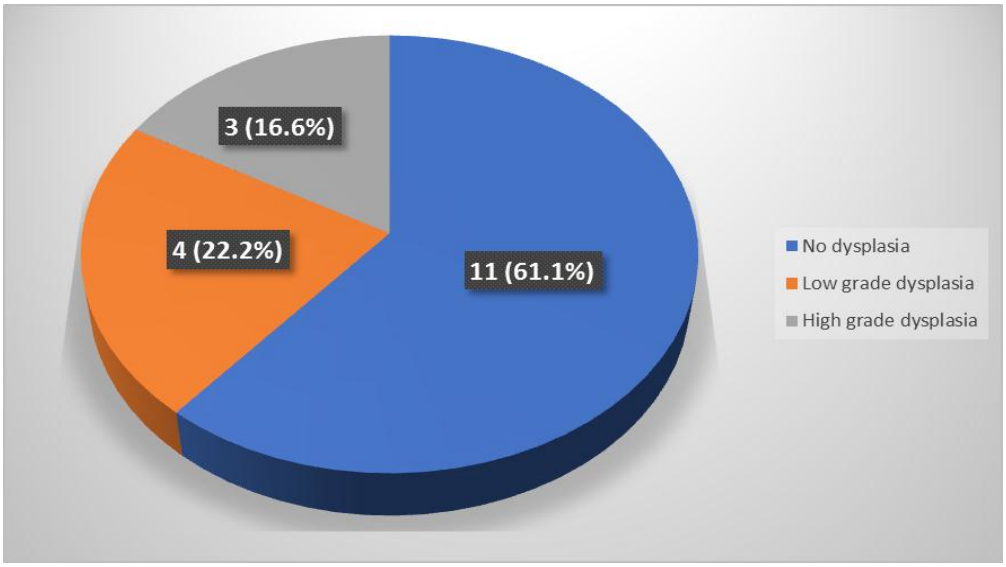

Figure 4: Frequency of dysplasia among cases of Barrett's esophagus.

Relationship between microscopic findings and age group

Table-3 illustrates the relationship between microscopic findings and age group. **A statistically** significant association was found between microscopic findings and age group (p value = 0.013).

Table 3: Relationship between microscopic findings and age group (p value = 0.013).

		Age group							Total
		10-19 years	**20-29 years**	**30-39 years**	**40-49 years**	**50-59 years**	**60-69 years**	**70-79 years**	
Microscopic findings	Inflammatory polyps	4 5.7%	10 14.3%	11 15.7%	14 20.0%	16 22.9%	11 15.7%	4 5.7%	**70** **100.0%**
	Reflux esophagitis	1 16.7%	1 16.7%	1 16.7%	0 0.0%	1 16.7%	1 16.7%	1 16.7%	**6** **100.0%**
	Adenocarcinoma	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 20.0%	4 80.0%	**5** **100.0%**
	Gastric heterotopia with inflammation	1 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	**1** **100.0%**
	Barrett's esophagus with no dysplasia	1 9.1%	0 0.0%	1 9.1%	3 27.3%	4 36.4%	1 9.1%	1 9.1%	**11** **100.0%**
	Barrett's esophagus with low grade dysplasia	0 0.0%	0 0.0%	0 0.0%	0 0.0%	2 50.0%	1 25.0%	1 25.0%	**4** **100.0%**
	Barrett's esophagus with high grade dysplasia	0 0.0%	0 0.0%	0 0.0%	2 66.7%	0 0.0%	1 33.3%	0 0.0%	**3** **100.0%**
Total		7 7.0%	11 11.0%	13 13.0%	19 19.0%	23 23.0%	16 16.0%	11 11.0%	**100** **100.0%**

Relationship between microscopic findings and gender

Table-4 illustrates the relationship between microscopic findings and gender. **No statistically** significant association was found between microscopic findings and gender (p value = 0.224).

Table 4: Relationship between microscopic findings and gender (p value = 0.224).

		Gender		Total
		Male	Female	
Microscopic findings	Reflux esophagitis	45 64.3%	25 35.7%	**70** **100.0%**
	Inflammatory esophageal polyps	2 33.3%	4 66.7%	**6** **100.0%**
	Esophageal adenocarcinoma	3 60.0%	2 40.0%	**5** **100.0%**
	Gastric heterotopia	0 0.0%	1 100.0%	**1** **100.0%**
	Barrett's esophagus with no dysplasia	7 63.6%	4 36.4%	**11** **100.0%**
	Barrett's esophagus with low grade dysplasia	4 100.0%	0 0.0%	**4** **100.0%**
	Barrett's esophagus with high grade dysplasia	3 100.0%	0 0.0%	**3** **100.0%**
Total		64 64.0%	36 36.0%	**100** **100.0%**

Relationship between endoscopic findings and age group

Table-5 illustrates the relationship between endoscopic findings and group. **A statistically** significant association was found between endoscopic findings and age group (p value = 0.002).

Table 5: Relationship between endoscopic findings and age group (p value = 0.002)

		Age group							Total
		10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	
Endoscopic findings	Esophageal thickening	1 4.3%	5 21.7%	1 4.3%	5 21.7%	4 17.4%	5 21.7%	2 8.7%	**23** **100.0%**
	Esophageal ulceration	0 0.0%	1 5.3%	6 31.6%	3 15.8%	4 21.1%	4 21.1%	1 5.3%	**19** **100.0%**
	Thick ulcerated esophageal lumen	0 0.0%	0 0.0%	0 0.0%	2 33.3%	2 33.3%	1 16.7%	1 16.7%	**6** **100.0%**
	Esophageal polyp	0 0.0%	2 22.2%	3 33.3%	0 0.0%	2 22.2%	0 0.0%	2 22.2%	**9** **100.0%**
	Esophageal erosion	0 0.0%	0 0.0%	0 0.0%	3 30.0%	4 40.0%	2 20.0%	1 10.0%	**10** **100.0%**
	Erythematous esophageal lesion	0 0.0%	0 0.0%	1 14.3%	4 57.1%	1 14.3%	1 14.3%	0 0.0%	**7** **100.0%**
	Esophageal nodule	4 36.4%	0 0.0%	1 9.1%	1 9.1%	3 27.3%	2 18.2%	0 0.0%	**11** **100.0%**
	Esophageal mass	0 0.0%	0 0.0%	0 0.0%	1 14.3%	1 14.3%	1 14.3%	4 57.1%	**7** **100.0%**
	Esophageal stricture	0 0.0%	1 50.0%	0 0.0%	0 0.0%	1 50.0%	0 0.0%	0 0.0%	**2** **100.0%**
	Normal mucosa	2 40.0%	2 40.0%	0 0.0%	0 0.0%	1 20.0%	0 0.0%	0 0.0%	**5** **100.0%**
	Circular esophageal folds	0 0.0%	0 0.0%	1 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	**1** **100.0%**
	Total	7 7.0%	11 11.0%	13 13.0%	19 19.0%	23 23.0%	16 16.0%	11 11.0%	**100** **100.0%**

Relationship between endoscopic findings and gender

Table-6 illustrates the relationship between endoscopic findings and gender. **No statistically** significant association was found between endoscopic findings and gender (p value = 0.913).

Table 6: Relationship between microscopic findings and gender (p value = 0.913).

		Gender		Total
		Male	Female	
Endoscopic findings	**Esophageal thickening**	14 60.9%	9 39.1%	**23** **100.0%**
	Esophageal ulceration	11 57.9%	8 42.1%	**19** **100.0%**
	Thick ulcerated esophageal lumen	4 66.7%	2 33.3%	**6** **100.0%**
	Esophageal polyp	5 55.6%	4 44.4%	**9** **100.0%**
	Esophageal erosion	8 80.0%	2 20.0%	**10** **100.0%**
	Erythematous esophageal lesion	5 71.4%	2 28.6%	**7** **100.0%**
	Esophageal nodule	7 63.6%	4 36.4%	**11** **100.0%**
	Esophageal mass	5 71.4%	2 28.6%	**7** **100.0%**
	Esophageal stricture	1 50.0%	1 50.0%	**2** **100.0%**
	Normal mucosa	4 80.0%	1 20.0%	**5** **100.0%**
	Circular esophageal folds	0 0.0%	1 100.0%	**1** **100.0%**
Total		64 64.0%	36 36.0%	**100** **100.0%**

Relationship between endoscopic findings and microscopic findings

Table-7 illustrates the relationship between endoscopic findings and microscopic findings. A statistically significant association was found between esophagitis and endoscopic findings (p value = 0.0001), inflammatory polyps and endoscopic findings (p value = 0.004), adenocarcinoma and endoscopic findings (p value = 0.0001), and Barrett's esophagus (without dysplasia) and endoscopic findings (p value = 0.012).

Table7: Relationship between microscopic and endoscopic findings.

		esophagitis		inf_polyp		adenocarcinoma		gastric_hetrotopia		barret_no_dys		barret_low_dys		barret_high_dys	
		Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
Endoscopic findings	Esophageal thickening	1	22	23	0	23	0	23	0	23	0	22	1	23	0
	Esophageal ulceration	3	16	19	0	19	0	19	0	17	2	19	0	18	1
	Thick ulcerated esophageal lumen	5	1	6	0	6	0	6	0	3	3	5	1	5	1
	Esophageal polyp	4	5	6	3	9	0	9	0	8	1	9	0	9	0
	Esophageal erosion	2	8	10	0	10	0	10	0	10	0	9	1	9	1
	Erythematous esophageal lesion	0	7	7	0	7	0	7	0	7	0	7	0	7	0
	Esophageal nodule	8	3	8	3	11	0	10	1	7	4	11	0	11	0
	Esophageal mass	7	0	7	0	2	5	7	0	6	1	6	1	7	0
	Esophageal stricture	0	2	2	0	2	0	2	0	2	0	2	0	2	0
	Normal mucosa	0	5	5	0	5	0	5	0	5	0	5	0	5	0
	Gerd grade 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Circular esophageal folds	0	1	1	0	1	0	1	0	1	0	1	0	1	0
Chi square at 95% level of significance		P-value = 0.0001		P-value = 0.004		P-value = 0.0001		P-value = 0.612		P-value = 0.012		P-value = 0.665		P-value = 0.641	

Relationship between microscopic findings and presentation

Table-8 illustrates the relationship between microscopic findings and presentation. **No statistically** significant association was found between microscopic findings and presentation (P value = 0.239).

Table 8: Relationship between microscopic findings and presentation (p value = 0.239).

		Chief complaint at clinical presentation							
		Heartburn	**Dysphagia**	**Dyspepsia**	**Epigastric pain**	**Vomiting**	**Melena**	**Regurgitation**	**Total**
Microscopic findings	Reflux esophagitis	23 32.9%	10 14.3%	13 18.6%	15 21.4%	7 10.0%	1 1.4%	1 1.4%	**70 100.0%**
	Inflammatory polyps	3 50.0%	2 33.3%	1 16.7%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	**6 100.0%**
	Adenocarcinoma	0 0.0%	5 100.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	**5 100.0%**
	Gastric heterotopia	0 0.0%	0 0.0%	0 0.0%	1 100.0%	0 0.0%	0 0.0%	0 0.0%	**1 100.0%**
	Barrett's esophagus with no dysplasia	4 36.4%	0 0.0%	1 9.1%	4 36.4%	2 18.2%	0 0.0%	0 0.0%	**11 100.0%**
	Barrett's esophagus with low grade dysplasia	1 25.0%	2 50.0%	1 25.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	**4 100.0%**
	Barrett's esophagus with high grade dysplasia	0 0.0%	1 33.3%	0 0.0%	2 66.7%	0 0.0%	0 0.0%	0 0.0%	**3 100.0%**
Total		31 31.0%	20 20.0%	16 16.0%	22 22.0%	9 9.0%	1 1.0%	1 1.0%	**100 100.0%**

Relationship between presence of ulcer in patients with reflux esophagitis and age group

Table-9 illustrates the relationship between presence of ulcer in patients with reflux esophagitis and age group. No statistically significant association was found between age group and presence of ulcer (p value = 0.220).

Table-9: Relationship between presence of ulcer in patients with reflux esophagitis and age group (p value = 0.222).

		Age group							Total
		10-19 years	**20-29 years**	**30-39 years**	**40-49 years**	**50-59 years**	**60-69 years**	**70-79 years**	
Microscopic findings	**Reflux esophagitis without ulcer**	0 0.0%	1 5.9%	6 35.3%	3 17.6%	3 17.6%	3 17.6%	1 5.9%	**17 100.0%**
	Reflux esophagitis with ulcer	4 7.5%	9 17.0%	5 9.4%	11 20.8%	13 24.5%	8 15.1%	3 5.7%	**53 100.0%**
Total		4 5.7%	10 14.3%	11 15.7%	14 20.0%	16 22.9%	11 15.7%	4 5.7%	**70 100.0%**

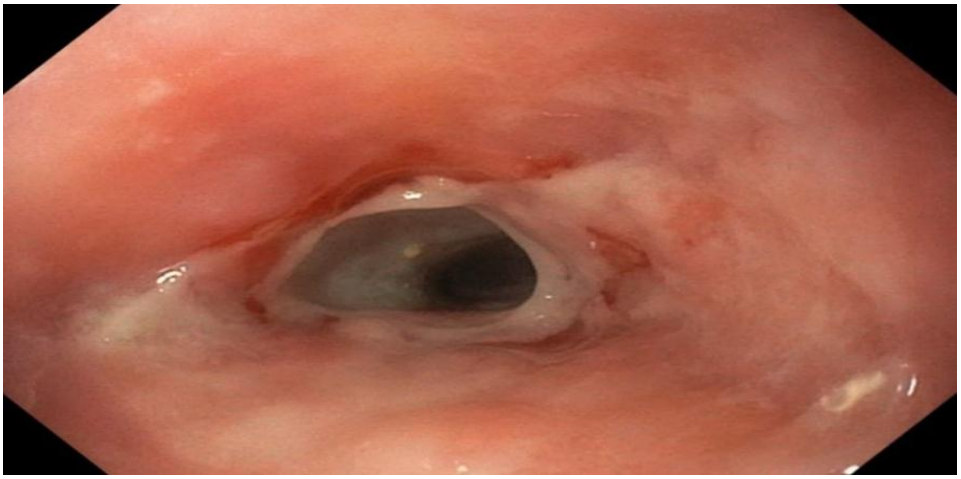

Figure 5: EGD of a 60 years old male showing ulceration (Black arrow) and narrowing (Stricture).

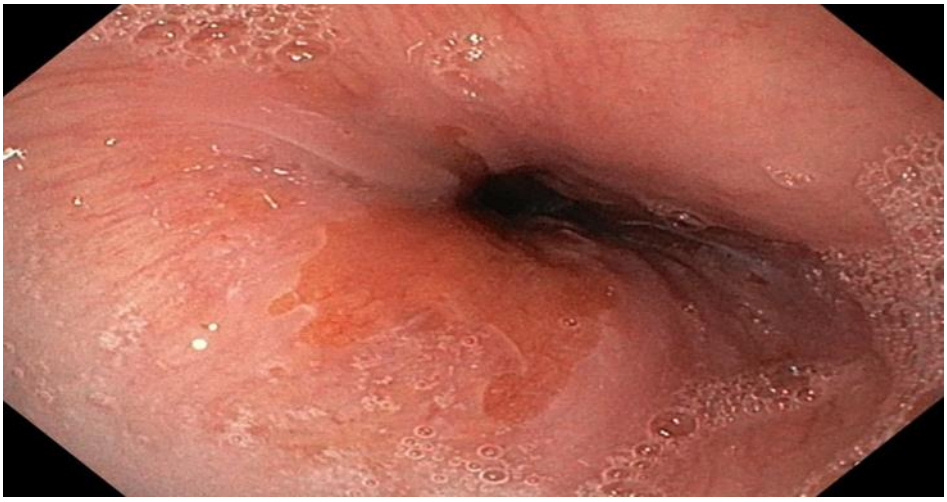

Figure 6: EGD of 46 years old women showing islands of salmon coloured reddish mucosa (Black arrow) coming out of the gastroesophageal junction suggestive of Barrett's esophagus.

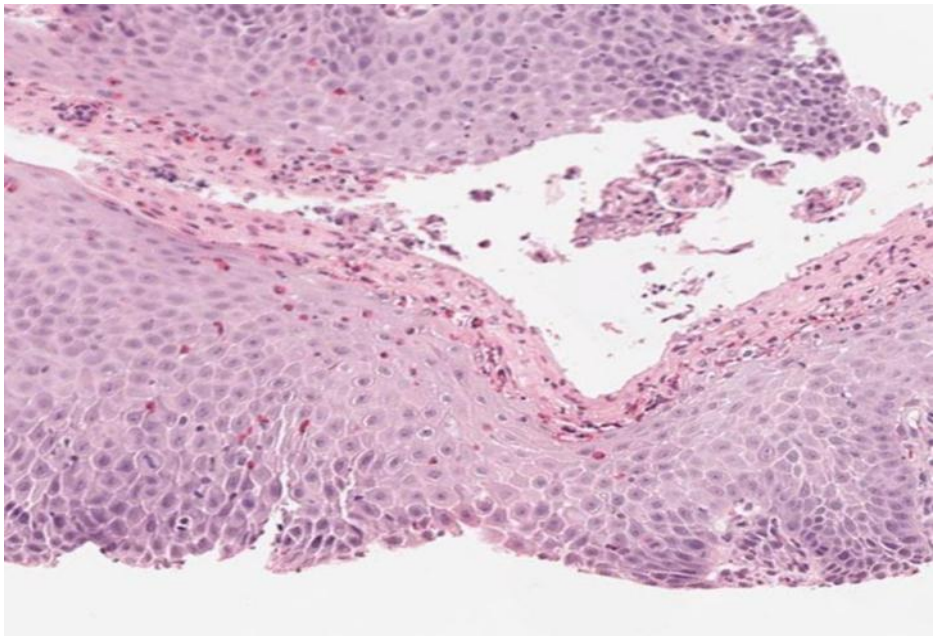

Figure-7: Section of an esophageal ulcer from a 53 years old female complaining of heartburn showing reflux esophagitis with basal cell hyperplasia, inflammatory cells infiltration, spongiosis and ulceration with granulation tissue (H&E, 10X).

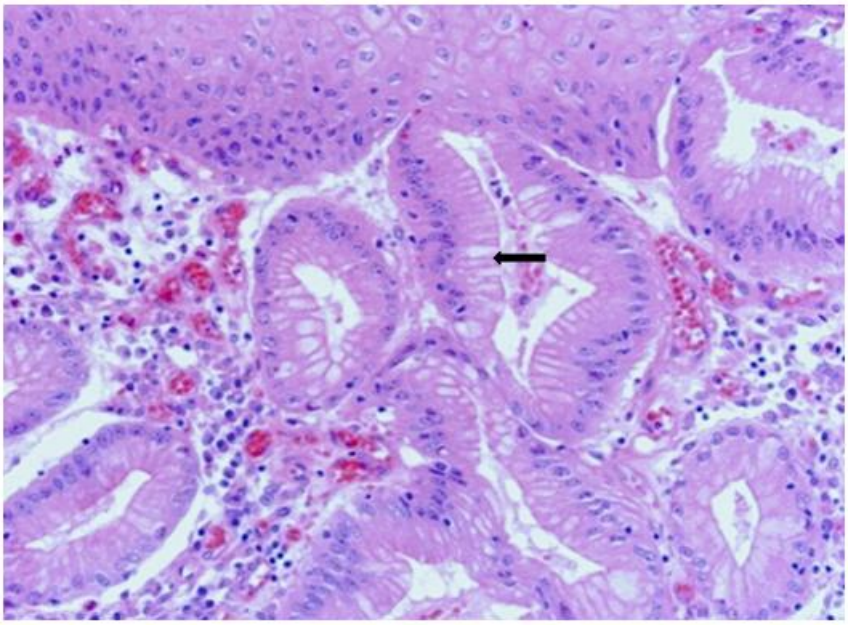

Figure-8: Section of an esophageal biopsy from a 48 years old male complaining of heartburn showing specialized columnar epithelium with scattered goblet (Black arrow) cells and no cytological atypia, Barrett's esophagus without dysplasia (H&E, 40X).

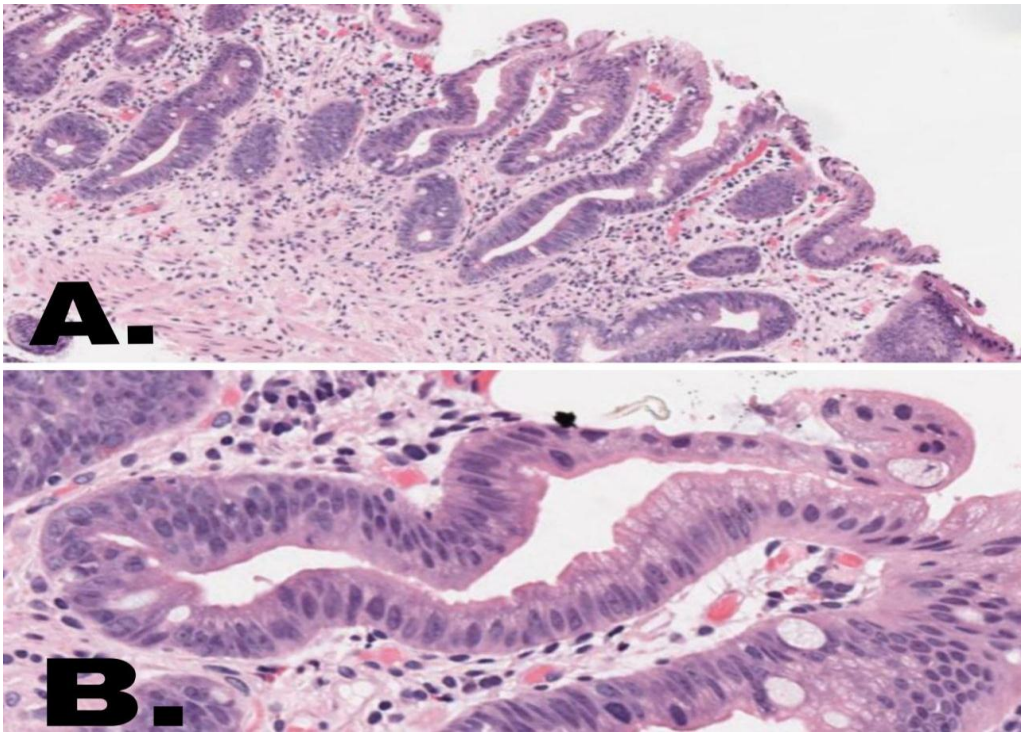

Figure-9: Section of an esophageal biopsy from a 63 years old male with heartburn. (A) Esophageal squamous epithelium replaced by columnar epithelium of intestinal type with goblet cells and low grade dysplasia (H&E,10X). (B) Nuclear enlargement, hyperchromasia, nuclear contour irregularity and stratification but limited to the basal half of the cell cytoplasm (H&E, 40X).

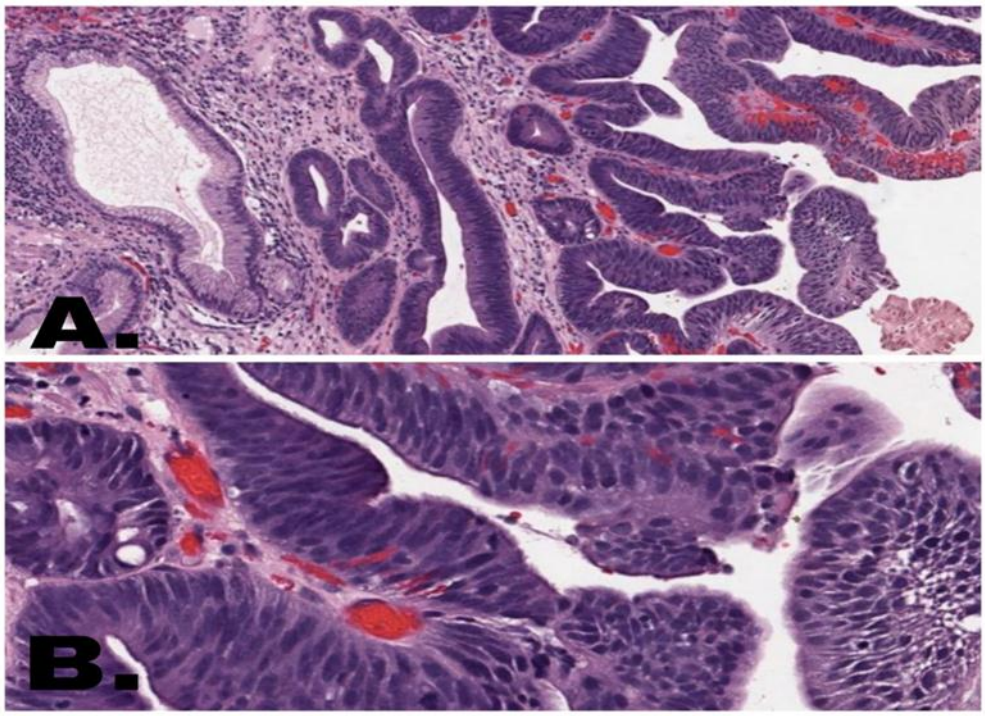

Figure-10: Section of an esophageal biopsy from a 60 years old male with GERD. (A) Barrett's esophagus with high grade dysplasia, note the archeticual distortion (H&E,10X). (B) The surface epithelium, show enlarged nuclei and an increased degree of nuclear stratification, involving the full thickness of the cell cytoplasm, and loss of cell polarity (H&E, 40X).

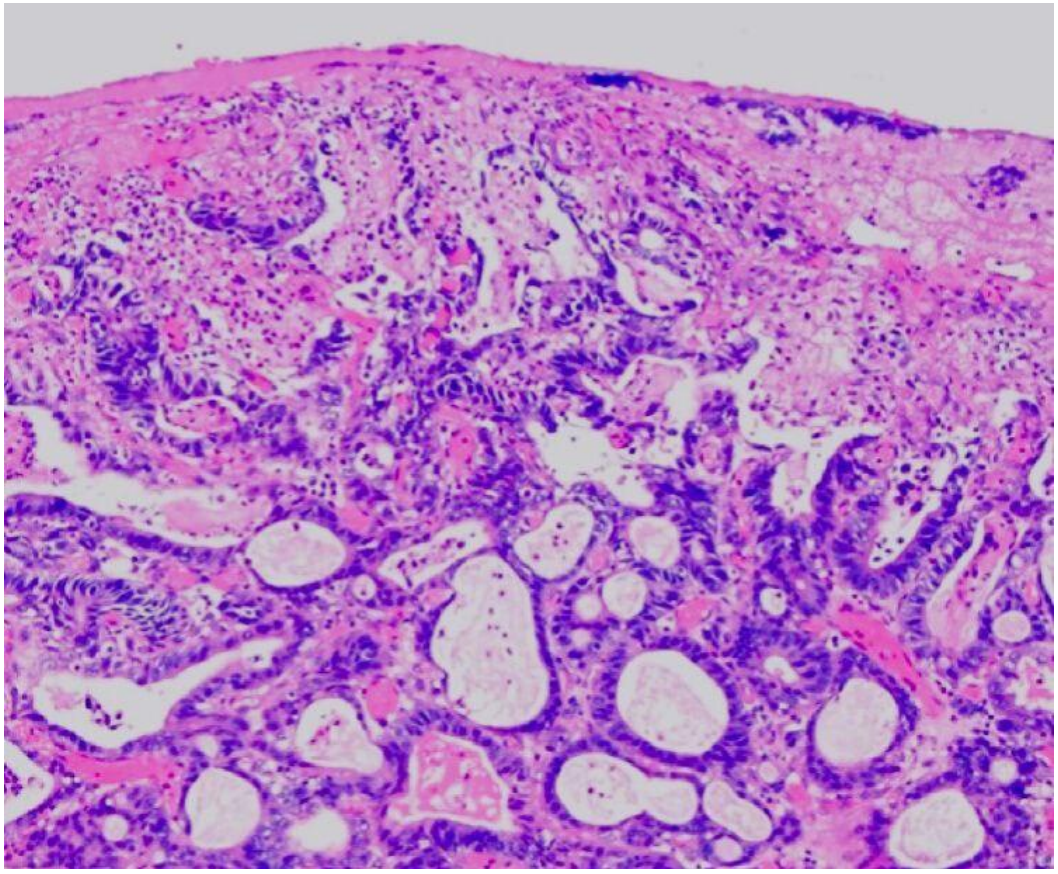

Figure-11: Section of an esophageal mass from a 73 years old male with hx of Barrett's esophagus showing anastomosing glandular pattern of esophageal adenocarcinoma (H&E 10X).

DISCUSSION

GERD is described as the presence of persistent symptoms from reflux of gastric contents into the esophagus, with or without mucosal injury. GERD is quite widespread, with more than 40% of the population in the United States reporting at least one episode of heartburn every month.[12]

Patients with heartburn and alarm symptoms are indicated for upper endoscopy (e.g., wight loss, anemia, recurrent vomiting and dysphagia). Moreover, patients with esophageal stricture and erosive esophagitis are also indicated for endoscopy to rule out Barrett's esophagus.[13]

In the present study, Barrett's esophagus was found in (18%) of the cases, this is much higher when compared to the study by (Dewan et al., 2018) who obtained a percentage of 1.6%.[14]

Regarding dysplasia; among the 18 cases of Barrett's esophagus, 11 (61.1%) had no dysplasia, 4 (22.2%) had low grade dysplasia, and 3 (16.6%) had high grade dysplasia. These findings are also higher than those observed by (Gopal et al., 2003) as no dysplasia was detected in the majority of cases (86.48%), while (9.53%) had low grade dysplasia, and only (3.62%) had high grade dysplasia.[15] In the present study, no statistically significant association was found between presence of dysplasia and age group; which is also in discordance with (Gopal et al., 2003) who found that the risk of dysplasia increased by 3.3%/year of age.[15]

Furthermore, adenocarcinoma was found in (5%) of cases in the present study. (Dewan et al., 2018) detected no cases of dysplasia nor adenocarcinoma among 120 patients with GERD;[14] while (Gopal et al., 2013) detected only 5 (1.6%) cases among 309 patients with Barrett's esophagus.[15]

All patients with adenocarcinoma presented with dysphagia. This is understandably given that dysphagia is the most common presenting symptom among patients with esophageal adenocarcinoma.[16]

Even with therapy, esophageal cancer is a deadly disease with an extremely poor survival rate. With an estimated incidence of 16,940 cases per year in the United States, esophageal cancers are the fifth most prevalent gastrointestinal cancer and the sixth most common cancer globally.[17]

The incidence of adenocarcinoma of the distal esophagus and gastroesophageal junction (GEJ) continues to rise significantly as a result of Barrett's esophagus.[18,19,20] Barrett's esophagus is the only recognized precursor to esophageal adenocarcinoma.[21]

The findings of the present study can be explained by the high prevalence of obesity and smoking in Iraq. (Hussein et al., 2013) found that smoking prevalence among Iraqi adolescents is among the highest in the middle east.[22] Furthermore, a national survey in Iraq found that 65.7% of the population were overweight/obese.[23] Moreover, Iraq is an endemic country for H. pylori as (Hussein et al., 2008) found a prevalence of 78%.[24]

More importantly however, is the poor patients education regarding GERD is also to blame. Although it is an established risk factor for adenocarcinoma,[25] Iraqi patients usually suffice to symptomatically treat their GERD with over-the-counter antacids or H2-receptor blockers without proper assessment by a family physician or GIT specialist.

In the present study, reflux esophagitis has been found in (70%) of patients. (Wo et al., 2004), (Garrido et al., 2003), and (Voutilainen et al., 2000) reported RE in 34%, 49%, and 62% of GERD patients in the US, Spain, and Finland respectively.[26,27,28]

Among 70 cases of reflux esophagitis, esophageal ulceration was found in 53 (75.7%) cases. This gives a clue that Iraqi patients with GERD are generally referred to endoscopy at a late time in disease development which allows for more advanced disease manifestation. In Egypt, (Gado et al., 2015) detected a percentage of 11% duodenal ulcer, 1% gastric ulcer, and no cases of esophageal ulceration among patients with reflux esophagitis.[29]

Moreover, the majority of endoscopic findings of esophageal thickening (22/23), erythematous esophageal lesions (7/7), and esophageal erosions (8/10) were found among cases of reflux esophagitis (p value = 0.0001). These findings are usually signs of Barrett esophagus that are also found in advanced reflux esophagitis, reflecting a common pathophysiologic ground;[30] In the present study, 5/6 cases of thick ulcerated esophageal lumen were found among cases with Barrett's esophagus.

Inflammatory esophageal polyps were found in 6% of cases. They are benign tumors of the GIT that are grow slowly and present with either obstructive or dyspeptic symptoms. The treatment is usually limited to local excision either by open procedure or by endoscopy.[31]

Study Limitations

1. The small sample size of the present study hinders us from drawing our findings to the general population.
2. Barret's esophagus was not assessed whether long or short segment. (Gopal et al., 2003) found that Patients with long segment Barrett's had a significantly greater prevalence of dysplasia compared to short segment.
3. No grading system has been employed to grade the endoscopic findings of esophagitis (i.e. Los Angeles

or Savary–Miller systems); and hence, the severity of esophagitis could not be assessed.

CONCLUSION

Relatively high percentages of Barrett's esophagus, dysplasia, and adenocarcinoma were detected among Iraqi patients undergoing esophageal endoscopy and biopsy for GERD symptoms. Moreover, the majority of patients with reflux esophagitis had esophageal ulceration.

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