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ROUTINE ENDOSCOPY BEFORE BARIATRIC SURGERY; NECESSITY OR OVERKILL

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ABSTRACT

Background: We aim to determine the frequency of patients with abnormal preoperative esophagogastroduodenoscopy (EGD) and factors associated with it in patients undergoing bariatric surgery to assess their impact on surgical planning.
Methods: A cross-sectional study was conducted at the Department of Surgery at a tertiary care hospital from October 2024 to March 2025. Patients planned for bariatric surgery with age between 16 and 70 years, BMI ≥ 27.5 kg/m² and ASA I-III who consented for preoperative EGD were included. EGD was performed by consultant gastroenterologists for abnormal EGD findings and data was collected by a surgical resident.
Results: A total of 159 patients were included in the study, with a preponderance of females 92 (57.9%). The mean age was 39.7 years, and the median BMI was 44.5 kg/m² (IQR 37.90 - 53.60). OSA (50.9%) and hypertension (49.1%) were the most common comorbidities. Abnormal EGD findings were reported in 21/159 (13.2%) patients. Gastritis was the most common finding in 14/159 (8.8%) patients, followed by ulcers in 9/159 (5.7%) patients. Among the 21 patients with abnormal findings, five (23.8%) patients required a change in

their planned surgical procedure. Stratified analysis showed that GERD and NSAID use were significantly associated with abnormal EGD findings.
Conclusion: Our study suggests that routine EGD is not necessary for all bariatric surgery patients due to the low prevalence of abnormal findings. EGD should be selectively performed in patients with a history of GERD and NSAID use to guide surgical decisions and improve postoperative care.

INTRODUCTION

Recognized as a global epidemic, obesity is one of the major health challenges the world is facing. Numerous illnesses, including diabetes, heart disease, gastroesophageal reflux disease (GERD) and various forms of cancer are associated with obesity [1]. In the US, obesity affects 18.5% of children and 39.6% of adults [2, 3]. Pakistan, being a low and middle-income country with a population of approximately 220 million people, is ranked tenth out of 188 countries for obesity, with half of its population being overweight or obese [4]. Bariatric surgery aims for substantial weight loss and the improvement of associated health issues [5, 6]. Compared to conventional obesity treatments, bariatric surgery reduces mortality from complications linked to obesity by 28%, as concluded by Swedish Obese Subjects Study [5].

Safe and successful bariatric surgery outcomes depend on a proper preoperative patient evaluation in addition to surgical expertise. The suitability of the chosen bariatric procedure is intended to be facilitated by an accurate preoperative assessment of bariatric patients, which includes Esophagogastroduodenoscopy (EGD) [7]. Diseases such as peptic ulcer disease and erosive esophagitis which must be treated before surgery can be diagnosed with EGD. Additionally, pathologies like diverticulum, mass lesion, or hiatal hernia which may require changes to the planned surgical procedure, can also be identified [1, 8]. Several studies have reported the prevalence of abnormal EGD results ranging from 51.0% to 89.5% [1, 3, 9]. A study conducted by Victoria C. Chang et al. in 631 patients revealed that 458 (72.6%) patients had abnormal EGD findings which included hiatal hernias (27.1%), esophagitis (26.5%), H. Pylori (8.6%), gastric ulcers (4.9%), Barrett's esophagus (4.6%), duodenal masses (0.6%), and duodenal ulcers (0.3%) while 116 (18.4%) patients had their planned bariatric procedure altered after the preoperative endoscopy [3].

A review of various guidelines, including the German guidelines and those from the European Association for Endoscopic Surgery, recommends that all bariatric patients undergo an EGD [7, 10, 11]. In contrast, the guidelines of the American Society for Metabolic & Bariatric Surgery (ASMBS) recommend that the decision to perform upper Gastrointestinal (GI) endoscopy during bariatric surgery should be customized [11-13]. Some researchers advocate for a selective approach to EGD in obese patients due to the invasiveness and cost for the procedure, as asymptomatic patients often show poor clinical significance [14]. Every investigation must be cost-effective, particularly in low middle-income countries (LMICs), where expenses are primarily paid out of pocket. EGD objectively identifies abnormal findings from which a better surgical plan can be established, making it a crucial part of the preoperative evaluation for bariatric surgery patients [15].

However, there is no consensus on whether EGD should be included as part of the preoperative workup for bariatric surgery and no prospective data exists on incidental abnormal EGD findings in the obese population of LMIC. The prevalence of obesity in Pakistan is influenced by variations in dietary habits and sedentary lifestyles. While access to over-the-counter medications such as Proton pump inhibitor (PPI) and Non-steroidal anti-inflammatory drug (NSAID) has always been readily available, health screening remains an unfamiliar concept to many. Consequently, due to invasiveness of EGD and the associated cost, it is a significant deterrent for both patient and surgeon. Therefore, in our population setup, EGD is essential to establish objective evidence of pathology before any surgical intervention as complication could impose additional financial burden on the patient.

This study will contribute to the establishment of objective data regarding the prevalence of abnormal EGD in asymptomatic and undiagnosed patients in our population undergoing bariatric surgery. The findings will significantly impact the type of surgery performed, the subsequent surgical plan, and any unexpected per-operative identification of pathology that may require on table changes. Conditions that require pre-operative care can be promptly addressed, potentially reducing surgical complications.

OBJECTIVE

To determine the frequency of patients with abnormal preoperative esophagogastroduodenoscopy (EGD) and factors associated with it in patients undergoing bariatric surgery.

MATERIALS AND METHODS

Participants and study design

This study employed a cross-sectional design and was conducted for six months, starting from October 2024, at the Department of Surgery at Patel Hospital, a single-center, tertiary care facility. Patients meeting the following inclusion criteria were selected: age 16-70 years, both sex, BMI $\geq$ 27.5 kg/m^2, ASA I-III, and those who consented for preoperative EGD as part of the mandatory workup for bariatric surgery [Annexure 2]. Exclusion criteria included patients who were mentally incapacitated, had a language barrier, used steroids, had prior gastric surgery or a previous abnormal EGD, a history of upper gastrointestinal disorders, or an EGD performed outside of our hospital.

Sample size calculation and sampling technique

A total of 159 patients were included in the study, with the sample size calculated using Open Epi software (https://www.openepi.com/SampleSize/SSPropor.htm). Based on a reported frequency of abnormal EGD findings of 72.6% from the article by Victoria C. Chang et al. [3] ("Routine preoperative endoscopy in patients undergoing bariatric surgery") and a margin of error of 7%, a sample size of 159 was determined at a 95% confidence level. The sampling technique used was nonprobability consecutive sampling.

Data collection procedures

Patients who were obese and attending a general surgery clinic with the intention of losing weight were evaluated. Individuals who were eligible and met the subject selection criteria of the study were included. EGD was performed by a consultant gastroenterologist as part of the mandatory preoperative workup for bariatric surgery.

Clinical data was collected by the principal investigator, a general surgery resident, using a proforma [Annexure 3] upon patient admission prior to the procedure. The information gathered included the medical record number, patient name, age (in years), weight (kg), height (cm), BMI (kg/m^2), and categorization according to the Asia Pacific criteria from the patient's initial hospital visit record in the database. Comorbidities such as diabetes (HbA1c > 6.5% or on oral

hypoglycemic agents or insulin), hypertension (BP > 140/90 mmHg on two or more readings or on antihypertensives), obstructive sleep apnea (OSA, defined by a STOP-BANG score ≥ 3), and gastroesophageal reflux disease (GERD, identified by symptoms such as retrosternal burning, heaviness, or regurgitation along with at least once a week use of any drug to counter acid secretion in stomach) and additional factors including smoking status and drug history (NSAIDs, PPIs) were documented. EGD findings (esophagitis, gastritis, hiatal hernia, ulcer, mass) were recorded based on the endoscopy report provided by the gastroenterologist.

Operational definitions

Obesity – Patients were categorized using the Asia Pacific Classification; At risk = 23-24.9 kg/m^2, Obese I = 25-29.9 kg/m^2, Obese II ≥ 30 kg/m^2 [16] and WHO classification Overweight (25-29 kg/m^2), Obese I (30-34.9 kg/m^2), Obese II (35-39.9 kg/m^2), Obese III (>40 kg/m^2) based on their computed BMI.

Abnormal Esophagogastroduodenoscopy (EGD) – A gastroenterology consultant with over 2 years of experience performed EGD on bariatric surgery patients at Patel Hospital's endoscopy suite. A patient report was issued followed by the upper GI tract exam from the esophagus to the duodenum.

EGD was labelled **abnormal** if **any one** of the findings mentioned below were identified:

- Esophagitis – Redness or erosions in the esophagus.
- Gastritis – Diffused redness of the stomach mucosa.
- Hiatal hernia – The distance between the squamocolumnar junction and the diaphragmatic impression is more than 2 cm, measured with the endoscope's hash marks (5 cm apart) in relation to the incisors.
- Ulcer (Gastric / Duodenal) – Erosion in gastric or duodenal mucosa.
- Mass – Any growth over the mucosa or swelling protruding intraluminally.

Confidentiality and ethical consideration

Data collection commenced after approval from the Ethical Review Committee of Patel Hospital. Informed consent was obtained from all patients [Annexure 1], with each assigned a unique ID to ensure patient confidentiality. A separate master sheet containing the medical record number and patient name was maintained by the principal investigator.

Data management and Analysis

Data was collected on hard copies, followed by data entry and analysis on SPSS version 22. If the continuous variables (age, weight, height, BMI) were normally distributed as per Shapiro-Kolmogorov test, we reported as mean +/- standard deviation (SD) otherwise median with interquartile range (IQR).

Categorical variables including sex, comorbid (Diabetes, Hypertension, OSA, GERD), current smoking status, BMI category, drug history (NSAIDs, PPI), overall abnormal EGD and abnormal findings (esophagitis, gastritis, hiatal hernia, ulcer, mass) were reported as frequencies and percentages.

A Stratified Analysis was performed for confounders and effect modifiers [BMI categories (obese class I and II), sex (male / female), current smoking, NSAIDs, GERD] and outcome (abnormal EGD) was compared between the categories with Chi-square test / Fisher exact test. Normally distributed numerical variables were compared between groups (normal vs. abnormal EGD) by independent t-test; and those with skewed distribution by Mann-Whitney U test. The p-value of <0.05 was considered statistically significant.

RESULTS

A total of 159 patients out of 164 were included in the study (Fig. 1). Among these patients, there was a female predominance, with 92 females (52.7%) included. The mean age was 39.69 ±11.8 years, and the median BMI was 44.50 kg/m² (IQR 37.90-53.60). Most patients were classified as obese class II (98.7%) according to the Asia Pacific classification, and 66.7% were categorized as obese class III according to the WHO classification. OSA (N=81, 50.9%) and HTN (N=78, 49.1%) were the most prevalent comorbidities. NSAID use was reported by 9.4% of patients, and 13.2% were smokers (Table 1).

Abnormal findings were observed in 21 (13.2%) patients, with the most common finding on endoscopy being gastritis, identified in 14 (8.8%) patients, followed by ulcers in nine (5.7%) patients, masses in two (1.3%) patients, hiatal hernia in two (1.3%) patients, and esophagitis in one (0.6%) patient (Table 2).

As shown in Fig. 1, out of 159 study participants, 138 patients with normal findings on their preoperative esophagogastroduodenoscopy (EGD) underwent surgery as initially planned. Of the 21 patients with abnormal EGD findings, six patients underwent MGB, and 11 patients underwent Sleeve Gastrectomy as planned while five had change in procedure. The detailed findings, changes in the surgical plan, and their rationale are summarized in Table 3.

Stratified analysis of patient characteristics and their association with abnormal EGD findings, as shown in Table 4, revealed that GERD and NSAID use were significantly associated with abnormal findings. Abnormal findings were more prevalent in patients with GERD (61.9%) compared to those without (40.6%, $p = 0.050$). NSAID use was significantly higher in the abnormal findings group (52.4%) compared to the normal findings group (2.9%, $p < 0.001$). Additionally, 23.8% of patients with abnormal findings required a change in procedure, while no patients in the normal findings group experienced a change ($p < 0.001$).

DISCUSSION

In our study, abnormal findings were identified in 13.2% of the patients. The most prevalent abnormal finding was **gastritis** (8.8%), followed by **ulcers** (5.7%). Five out of 159 patients (3.14%) experienced a change in the planned procedure due to abnormal endoscopy.

For comparison, a comprehensive literature review of 63 studies, published by Brown et al. [8] reported that 10,531 out of 22,495 (55.5%) patients had abnormal findings, with 2,545 (16.8%) patients experiencing a change in surgical management. The most common abnormal findings identified were gastritis (19.3%), hiatal hernia (19.6%), and esophagitis (12.4%). In contrast, Moulla et al. [7] reported abnormal EGD findings in their cohort of 636 patients, with gastritis being the most common (68.7%), hiatal hernias in 207 (32.5%) patients, and esophagitis in 139 (21.9%) patients.

Similarly, Chang et al. [3] study reported a higher rate of abnormal endoscopic findings, with 83.2% of patients showing abnormalities and 18.4% experiencing a change in their planned bariatric procedure which included 23 (5.8%) patients who underwent hiatal hernia repair, and three patients (0.8%) who were found to have mass/polyp in duodenum and stomach during screening EGD, leading to additional subtotal gastrectomy. Our study also reported that among the 21 patients with abnormal EGD findings, 23.8% experienced a delay or change in their initial surgical plan, which also included the excision of a gastrointestinal stromal tumor (GIST). This signifies the importance of preoperative identification of such lesions through EGD enabling more effective patient counseling and facilitates informed decision-making regarding surgical approaches.

Sawathanon et al. [1] retrospective study identified that 265 of 461 patients (57.5%) presented with abnormal EGD findings, with the most common being gastritis (31.2%), followed by hiatal hernia (10.2%), benign polyp (8.5%), and peptic ulcer (7.4%). Univariate analysis revealed that male sex ($p = 0.008$) and NSAID use ($p = 0.002$) were significantly associated with changes or delays in the surgical plan. These findings align with our study, where *GERD* and *NSAID* use were also identified as significant risk factors associated with abnormal EGD findings.

A key strength of this study is its provision of factual data on the Pakistani population, with identified demographic and body weight correlations that help validate existing theories and advance our understanding of health trends in this group. The findings of this study show that preoperative EGD is valuable for a selected group of patients, helping to detect and address pathologies, while also influencing the decision on the appropriate type of bariatric surgery to ensure patient safety.

Additionally, a dedicated team of endoscopists performed all procedures exclusively at our center, minimizing observational bias in the interpretation of endoscopic findings. Further reduction in bias and improvement in result consistency could be achieved by having a single endoscopist conduct all EGD procedures.

Although the study was conducted at a single center with a sample size of 159 patients, it lays the groundwork for larger-scale research across multiple centers and extended study periods. This would allow a more comprehensive evaluation of the prevalence of abnormal findings and the impact of preoperative EGD on surgical planning.

At present, there is no evidence supporting the cost-effectiveness of routinely conducting preoperative EGD for all patients scheduled for bariatric surgery. Therefore, it is crucial to identify predictive factors that can help determine the likelihood of detecting clinically significant endoscopic findings. Even though statistically not significant, patients with WHO Class III obesity had higher likelihood of having abnormal findings on EGD as seen in our data analysis (Table 4), highlighting the potential to reduce complications and healthcare costs through targeted screening.

Our study has several limitations that should be considered. First, as an observational study, it cannot compare outcomes between patients who underwent preoperative endoscopy and those who did not, limiting our ability to make definitive conclusions regarding the necessity of preoperative EGD. Additionally, the relatively small sample size may hinder the generalizability of our findings to larger populations. We were also unable to evaluate the financial impact of preoperative endoscopy or assess the associated morbidity of the procedure.

Due to the study's limited duration, we were unable to track postoperative outcomes, especially for patients with abnormal EGD findings who proceeded with the originally planned surgical approach. Despite these limitations, our study offers valuable insights, highlighting that factors such as *GERD* and *NSAID use* may contribute to abnormal EGD findings, which could necessitate a reconsideration of the planned surgical procedure.

CONCLUSION

In conclusion, our study suggests that routine EGD is not mandatory for all bariatric surgery patients given the low prevalence of abnormal findings, cost and discomfort of the procedure. EGD should be selectively conducted in patients with a history of GERD or NSAID use to inform surgical decisions and enhance postoperative care.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Study concept and design: AH and GM; acquisition of data: AH; analysis and interpretation of data: AH and GM; drafting of the manuscript: AH and FA; critical revision of the manuscript: AH, FA and GM; statistical analysis: AH, FA and GM; obtained funding: N/A; administrative, technical, or material support: N/A; and study supervision: GM.

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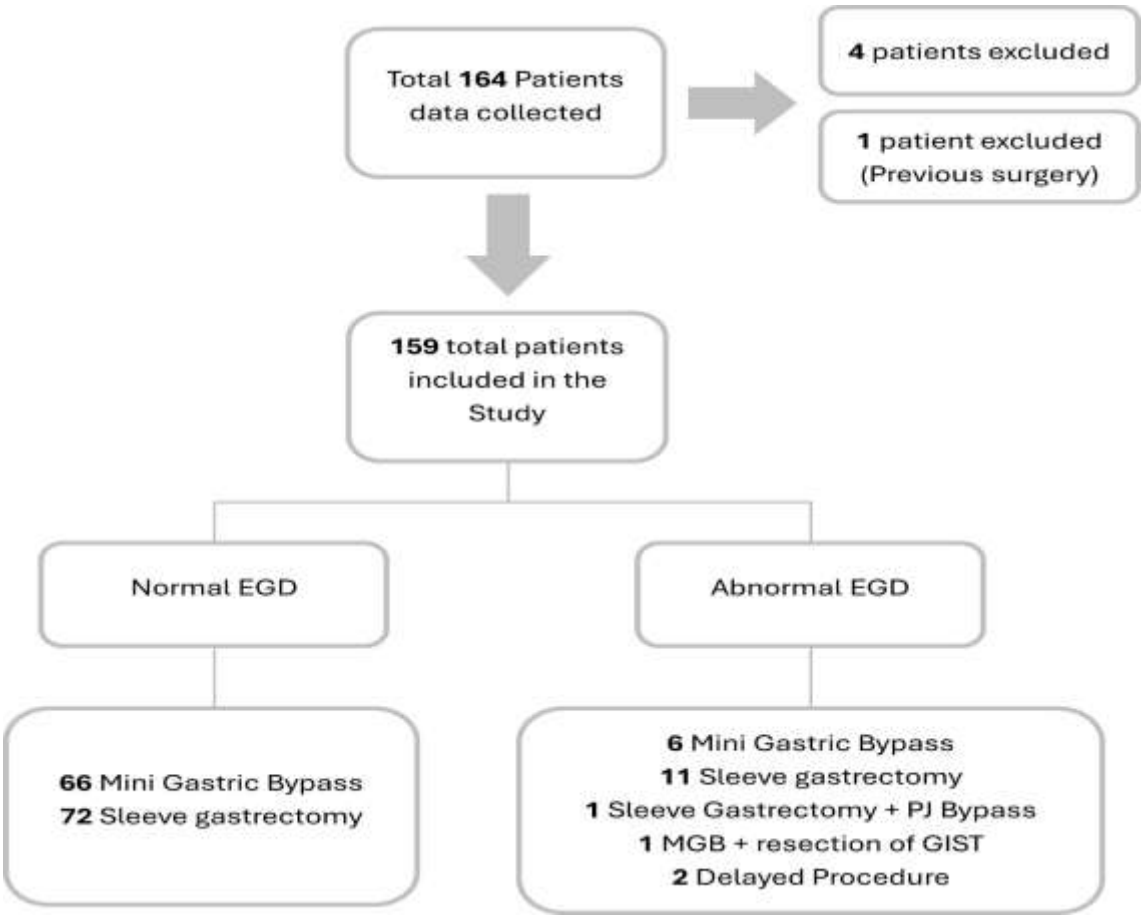

Figure 1. Case recruitment after initial data collection and surgeries performed, including the number of cases with procedural changes in each group.

Age *	39.69 ±11.18
Height *	163.49 ±10.87
Weight †	120 (106 - 139)
BMI †	44.50 (37.90 - 3.60)

*Mean ± SD, † Median (IQR)

Sex Male Female	 67 (42.1%) 92 (57.9%)
Comorbid DM HTN OSA GERD	 62 (39%) 78 (49.1%) 81 (50.9%) 69 (43.4%)
Current smoking Yes No	 21 (13.2%) 138 (86.8%)
Durg Hx None PPI Others	 107 (67.3%) 7 (4.4%) 45 (28.3%)
NSAIDs	15 (9.4%)
BMI Categories (Asian) Obese I (25-29.9 **kg/m^2**) Obese II (≥30 **kg/m^2**)	 2 (1.3%) 157 (98.7%)
BMI Categories (WHO) Overweight (25-29 **kg/m^2**) Obese I (30-34.9 **kg/m^2**) Obese II (35-39.9 **kg/m^2**) Obese III (>40 **kg/m^2**)	 2 (1.3%) 12 (7.5%) 39 (24.5%) 106 (66.7%)
No. of Abnormal EGD	21 (13.2%)

Table 1. Patient Characteristics

Abnormal Findings	*N=159* (%)
Esophagitis	1 (0.6%)
Gastritis	14 (8.8%)
Ulcer	9 (5.7%)

Mass	2 (1.3%)
Hiatal Hernia	2 (1.3%)

Table 2. No. Abnormal findings identified on preoperative EGD

	Abnormal Finding	Planned Procedure	Change in plan with rationale
Patient 1	Gastritis	MGB	**Delayed procedure** for H. Pylori eradication therapy.
Patient 2	Gastritis, Ulcer	MGB	**Delayed procedure** for H. Pylori eradication therapy.
Patient 3	Gastritis, Mass (GIST)	LSG	**Resection of antral GIST** in conjunction with per operative endoscopy, followed by creation of gastric pouch for **MGB** proximal to the resection site
Patient 4	Esophagitis, Gastritis, Ulcer	MGB	**LSG** for surveillance endoscopy keeping in view the history recurrent ulcers & candidiasis.
Patient 5	Ulcer	MGB	**LSG + PJ Bypass** to manage diabetes as well as allow surveillance endoscopy of stomach keeping in view the history of recurrent ulcers.

MGB: Mini Gastric Bypass; LSG: Laparoscopic Sleeve Gastrectomy; Modified Procedure (MGB + resection of GIST, Sleeve Gastrectomy + PJ bypass)

Table 3. Change in surgical plan and rationale for patients with abnormal finding

Variables	Abnormal Finding on EGD		p-value
	Yes	No	
Age (years) *	39 ±11	44 ±11	0.04 (a)
BMI (kg/m^2) †	44.40 (38.60 - 51.30)	44.50 (37.90 - 53.60)	0.82 (b)
Sex			0.37 (c
Male	81 (58.7%)	11 (52.4%)	
Female	57 (41.3%)	10 (47.6%)	
Asian BMI			0.24 (d)
Obese I (25-29.9 kg/m^2)	1 (0.7%)	1(4.8%)	
Obese II (≥ 30 kg/m^2)	137 (99.3%)	20 (95.2%)	
WHO BMI Categories			0.42 (d)
Overweight (25-29.9 kg/m^2)	1 (0.7%)	1 (4.8%)	
Obese I (30-34.9 kg/m^2)	10 (7.2%)	2 (9.5%)	
Obese II (35-39.9 kg/m^2)	35 (25.4%)	4 (19.0%)	
Obese III (>40 kg/m^2)	92 (66.7%)	14 (66.7%)	
HTN			0.15 (c)
No	73 (52.9%)	8 (38.1%)	
Yes	65 (47.1%)	13 (61.9%)	
DM			0.37 (c)
No	83 (60.1%)	14 (66.7%)	
Yes	55 (39.9%)	7 (33.3%)	
OSA			0.53 (c)
No	68 (49.3%)	10 (47.6%)	
Yes	70 (50.7%)	11 (52.4%)	
GERD			0.05 (c)
No	82 (59.4%)	8 (38.1%)	
Yes	56 (40.6%)	13 (61.9%)	
Smoking			0.54 (c)
No	120 (87.0%)	18 (85.7%)	
Yes	18 (13.0%)	3 (14.3%)	
NSAIDs			<0.001 (d)
No	134 (97.1%)	10 (47.6%)	
Yes	4 (2.9%)	11 (52.4%)	
Change in procedure			<0.001 (d)
No	138 (100.0%)	16 (76.2%)	
Yes	0 (0.0%)	5 (23.8%)	

*Mean ± SD, † Median (IQR)

a- Independent t-test; b- Mann-Whittney U; c- Chi Square test; d- Fischer Exact test

Table 4. Stratified Analysis of patient characteristics and their association with abnormal EGD findings