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EVALUATION OF UPPER DIGESTIVE ENDOSCOPY FINDINGS AND HISTOPATHOLOGICAL FINDINGS IN DIABETIC PATIENTS

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Abstract: Background: Diabetes Mellitus (DM) is the most common endocrine pathology. Diabetic neuropathy can affect the gastrointestinal tract, leading to dyspepsia and subsequent upper gastrointestinal diseases. Materials and Methods: In this descriptive observational retrospective study, we reviewed the clinical records and pathology reports of 236 patients who underwent elective upper endoscopy with biopsy throughout the year 2022. Data was analyzed using frequencies, percentages and correlation tests of Spearman and Odds Ratio (OR). Results: We discovered that epigastralgia was the leading presenting symptom that led to endoscopic evaluation in both diabetic and non-diabetic patients. Gastritis was the most frequent finding in both groups (97.5%). Pangastritis was more common in DM (56.8%) and antral gastritis was most common in non-diabetics (66.1%). Esophageal reflux, peptic ulcer disease, and duodenitis was more common in diabetics than in non-diabetics. Over 95% of both groups were positive for H.pylori infection. Conclusions: Diabetes mellitus leads to gastrointestinal complications due to dyspepsia and diabetic neuropathy. It is of great importance that the symptoms and gastrointestinal complications are considered at the time of diagnosis and management of patients with diabetes mellitus. Integrating clinical history, age, endoscopic and histopathological findings.

INTRODUCTION

Diabetes mellitus (DM) is the most common endocrine pathology, with a prevalence of more than 13.5% in the Dominican Republic [1]. A common complication includes dyspepsia, which has been identified in 40% of patients with DM [2]. Dyspeptic symptoms in patients with DM severely impair quality of life, are slow, difficult, and sometimes do not respond to treatment. Similar studies have shown a

relationship between dyspepsia and glycemic control, with dyspepsia being higher in DM patients with poor glycemic control [2].

Gastroparesis is a syndrome characterized by slowed gastric emptying and upper gastrointestinal symptoms that suggest, but are not associated with, gastric outlet obstruction. Hyperglycemia, autonomic neuropathy, inflammation, and enteric neuromuscular injury are implicated in the pathogenesis. The 5-year survival of people with gastroparesis is 67% compared to the expected survival of 81% [3]. Gastroparesis can significantly affect quality of life and up to 50% of patients have significant anxiety and/or depression [4].

On the other hand, gastrointestinal complications, such as gastroesophageal reflux disease and peptic ulcer, could go unnoticed as a result of reduced pain perception, and these may affect quality of life and glycemic control in diabetic subjects [5]. Analysis of upper endoscopy and histopathological findings are essential for the early diagnosis and approach of those underlying causes concerning the symptom of dyspepsia.

We aim to study the macroscopic and histological changes of the gastroduodenal mucosa in DM patients and determine whether there is a correlation to the disease.

MATERIALS AND METHODS

This is an analytical observational case-control study done at a tertiary care hospital in Santo Domingo, Dominican Republic.

The population consisted of 416 patients who underwent upper endoscopy at INDEN during the period from January 1 to December 31, 2022. A sample calculation was carried out using the Raosoft Inc. calculator, with a margin of error of 5% and a confidence interval of 95%, obtaining a sample size of 200 patients, managing to collect 236 patients for this study. Data was collected retrospectively from endoscopic and histopathologic reports of the 236 patients.

Inclusion criteria include patients over 18 years old, whom upper endoscopy with biopsy was performed. Exclusion criteria include patients with incomplete records and those without a past medical history, unable to determine the presence of diabetes mellitus. This research obtained the data through indirect observation of patient records, specif-ically upper endoscopy reports). The method used for the research was selected using a template for data collection and subsequent analysis.

The information collected was organized by formulating tables corresponding to the results obtained in relation to the study variables. For this, electronic data processing with Microsoft Excel programs was used. For data analysis with inferential statistics, the JASP program was used to obtain the Spearman correlation and the Odds Ratio (OR).

RESULTS

In total, 236 patients (177 females and 59 males) underwent upper endoscopy. No patients were under 18 years old; 234 patients were between 18 and 84 years old, and 2 patients were older than 85 years. Half of the patients had diabetes mellitus, whereas the other half did not have diabetes mellitus (Table 1).

Epigastralgia was the most common presenting symptom in both diabetics (50.8%) and non-diabetics (44.1%). Endoscopy for purposes of screening was more common in non-diabetics, with a very low percentage in diabetics (11%). Other presenting symptoms include dyspepsia, reflux, vomiting, hematemesis, dysphagia and abdominal distention (Table 2).

Results show that gastritis was the most common endoscopic finding in both groups (97.5%). Pangastritis was more prevalent in diabetic patients, while antral gastritis was more prevalent in non-diabetics. Esophageal reflux, duodenitis, peptic ulcer disease, and

esophagitis were more common in diabetics than in non-diabetics. A statistical association was found between gastritis, duodenitis and diabetes mellitus (p <0.05). (Table 3).

Biopsy results show that gastritis was the most common histopathological finding in both groups (99.2%). As in the upper endoscopy results. Pangastritis, peptic ulcer disease and esophagitis were more prevalent in diabetic patients, while antral gastritis was more prevalent in non-diabetics. However, biopsy results of duodenitis were the same in both groups (1.7%). Both groups had a high frequency of H.pylori infection (95.8% and 96.6%, respectively). A statistical association was found between gastritis and diabetes mellitus (Table 4).

227 patients with gastritis had a positive result for H. pylori infection. 53 patients with duodenitis also had a positive result for H. pylori infection. No statistical association was found between gastritis, duodenitis and H.pylori infection (p>0.05) (Table 5).

Age	Frecuency	Percentage
18-24	7	3.0%
25-39	49	20.8%
40-54	71	30.1%
55-69	86	36.4%
70-84	21	8.9%
> 85	2	0.8%
Total	**236**	**100%**
Gender		
Male	59	25.0%
Female	177	75.0%
Total	236	100%
Diabetes Mellitus		
Yes	118	50%
No	118	50%
Total	**236**	**100%**

TABLE 1. Identification of sociodemographic data of diabetic and non-diabetic patients who under- went upper endoscopy

DISCUSSION

236 patients undergoing upper endoscopy in 2022 were selected, 50% of these (118/236) suffered from diabetes mellitus and the remaining 50% (118/236) did not suffer from diabetes mellitus. The average age was 51.4 years ± 15.0 SD (49.5-53.3). The most affected age range was between 55-69 years, which constitutes 36.4% of the sample (86/236), while the most prevalent gender were females with a 75% of the sample (177/236).

Regarding the reasons for endoscopy, epigastralgia was the most frequent with 50.8% in diabetic patients (60/118) and 44.1% in non-diabetics (52/118) with a total of 112 patients (47.5%) in both groups, findings consistent with the study by Abboud et al.

"The most common presenting symptom was epigastric pain (70.4%)" [6]. Other reasons for endoscopy were a cluster of symptoms reported as dyspepsia in 24.6% of diabetic patients (29/118) and 16.1% in non-diabetics (19/118), reflux in 14.4% of diabetic patients (17/118), and 11.0% in non-diabetics (13/118), and screening in 11.0% of diabetic patients (13/118) and 28.8% in non-diabetics (34/118).

Less common reasons for endoscopy included nausea, vomiting, hematemesis or melena, abdominal distension, and dysphagia. Of all the reasons for endoscopy, epigastralgia, dyspepsia, reflux, vomiting, hematemesis/ melena and dysphagia obtained an Odds Ratio (OR) of >1, indicating an association of these symptoms in patients with diabetes mellitus. However, no statistical significance was demonstrated in these findings (p >0.05). Regarding screening as a motive for endoscopy, the statistical tests showed a p value <0.05 and an OR <1 with a confidence interval that excludes the null value. Thus demonstrating that upper endoscopy is not performed more frequently as a screening method in diabetic people, unlike non-diabetic patients.

Reason for Endoscopy	Diabetics n = 118 (%)	Non Diabetics n=118 (%)	p Value	Odds Ratio (95% CI)
Epigastralgia	60 (50.8)	52 (44.1)	0.30	1.31 (0.79-2.19)
Screening	13 (11.0)	34 (28.8)	<0.001	0.31 (0.15-0.62)
Dyspepsia	29 (24.6)	19 (16.1)	0.11	1.70 (0.89-3.24)
Reflux	17 (14.4)	13 (11.0)	0.44	1.36 (0.63-2.94)
Hematemesis	7 (5.9)	3 (2.5)	0.20	2.42 (0.61-9.58)
Vomiting	4 (3.4)	3 (2.5)	0.70	1.35 (0.29-6.15)
Nausea	1 (0.8)	1 (0.8)	1.00	1.00 (0.06-16.18)
Abdominal distension	1 (0.8)	1 (0.8)	1.00	1.00 (0.06-16.18)
Dysphagia	2 (1.7)	0 (0)	0.16	5.09 (0.24-107.0)

TABLE 2. Identification of the reasons for upper endoscopy and their correlation with the presence of diabetes mellitus

Endoscopic Findings	Diabetics n = 118 (%)	Non Diabetics n = 118 (%)	p Value	Odds Ratio (95% CI)
Pangastritis	65 (55.1)	38 (32.2)	<0.001	2.58 (1.52-4.39)
Antral Gastritis	50 (42.4)	77 (65.3)	<0.001	0.39 (0.23-0.66)
Esophageal Reflux	33 (28.0)	24 (20.3)	0.17	1.52 (0.83-2.78)
Gastric Ulcer	30 (25.4)	19 (16.1)	0.08	1.78 (0.93-3.38)
Duodenal Ulcer	4 (3.4)	1 (0.8)	0.18	4.11 (0.45-37.29)
Hiatal Hernia	23 (19.5)	23 (19.5)	1.00	1.00 (0.53-1.90)
Duodenitis	11 (9.3)	3 (2.5)	0.03	3.94 (1.07-14.51)
Esophagitis	9 (7.6)	8 (6.8)	0.80	1.14 (0.42-3.05)
Gastric Tumor	4 (3.4)	5 (4.2)	0.74	0.79 (0.21-3.03)
Esophageal Tumor	0	1 (0.8)	0.32	0.33 (0.01-8.20)
Esophageal Varices	2 (1.7)	0	0.16	5.09 (0.24-107.08)

TABLE 3. Evaluation of upper endoscopy findings and their correlation with diabetes mellitus

Histopathology Findings	Diabetics n = 118 (%)	Non Diabetics n=118 (%)	p Value	Odds Ratio (95% CI)
Pangastritis	67 (56.8)	39 (33.1)	<0.001	2.66 (1.57-4.52)
Antral Gastritis	50 (42.4)	78 (66.1)	<0.001	0.38 (0.22-0.64)
Gastric Ulcer	30 (25.4)	19 (16.1)	0.08	1.78 (0.93-3.38)
Duodenal Ulcer	4 (3.4)	1 (0.8)	0.18	4.11 (0.45-37.29)
Duodenitis	2 (1.7)	2 (1.7)	1.00	1.00 (0.14-7.22)
Esophagitis	5 (4.2)	4 (3.4)	0.74	1.26 (0.33-4.82)
Gastric Polyp	8 (6.8)	5 (4.2)	0.39	1.64 (0.52-5.18)
Malignancy	0 (0)	1 (0.8)	0.32	0.33 (0.01-8.20)
H. pylori infection	113 (95.8)	114 (96.6)	0.74	0.79 (0.21-3.03)

TABLE 4. Evaluation of histopathology findings and their correlation with diabetes mellitus

Histopathology Findings	H. pylori positive	H. pylori negative	p Value	Odds Ratio (95% CI)
Pangastritis	104 (44.1)	2 (0.9)	0.16	2.96 (0.602-14.56)
Antral Gastritis	123 (52.1)	5 (2.1)	0.94	0.95 (0.25-3.62)
Gastric Ulcer	48 (20.3)	1 (0.4)	0.47	2.15 (0.26-17.57)
Duodenal Ulcer	5 (2.1)	0 (0)	0.65	0.47 (0.02-9.13)

TABLE 5. Correlation of H. pylori infection and presence of gastritis and peptic ulcer disease

Regarding endoscopic findings, gastritis was the most frequent finding in both diabetic patients with 97.5% (115/118) and non-diabetics with the same frequency 97.5% (115/118), findings consistent with the study of Abboud et al. "Gastritis was the most common endoscopic pathology in this study (78.3%)" [6]. Reports of gastritis were divided into pangastritis and gastritis limited to the antrum. In diabetic patients, pangastritis was more prevalent than antral gastritis, with a frequency of 55.1% (65/118) and 42.4% (50/118), respectively. On the other hand, in non-diabetic patients the prevalence of antral gastritis was greater than pangastritis with 65.3% (77/118) and 32.2% (38/118), respectively.

Correlating the presence of pangastritis in diabetic and non-diabetic patients, a statistical significance was obtained with a value of $p < 0.001$ and an Odds Ratio >1 as well as a confidence interval that excludes the null value, which indicates a strong association of pangastritis with the presence of diabetes mellitus. On the other hand, the correlation of antral gastritis similarly demonstrated statistical significance with a p value <0.001 and an Odds Ratio <1 with a confidence interval that excludes the null value, indicating a greater risk of antral gastritis in the control group than in diabetics.

Peptic ulcer disease was another of the most prevalent endoscopic findings in diabetic patients, with a frequency of 28.8% (34/118) and 16.9% (20/118) in non-diabetics. These findings differ from those of Abboud et al. "However, gastric ulcer (GU) (8.4%) and duodenal ulcer (DU) (3.5%) were the least prevalent findings" [6]. Gastric ulcer was more prevalent than duodenal ulcer, with 25.4% (30/118) in diabetic patients and 16.1% (19/118) in non-diabetic patients. The presence of both ulcers produced an Odds Ratio (OR) of >1, indicating an association

of these symptoms in patients with diabetes mellitus; however, no statistical significance was demonstrated in these findings (p >0.05 and CI including the null value).

The presence of duodenitis was found in 9.3% of diabetic patients (11/118) and 2.5% in non-diabetics (3/118), yielding statistical significance: p <0.05, odds ratio >1 and a confidence interval that excludes null value, which proves a significance between duodenitis and the presence of diabetes mellitus, data that differ from those of Vaishnav et al. "There was a disparity in the findings of duodenitis. There were no significant differences between patients with diabetes and non-diabetics in the macroscopic finding of duodenitis" [7].

The prevalence of esophageal reflux, esophagitis and esophageal varices was higher in diabetic than non-diabetic patients (p>0.05). The prevalence of gastric and esophageal elevation/tumor was higher in non-diabetic patients (p>0.05). The prevalence of hiatal hernia was the same in both populations at 19.5% (23/118). There was no statistical significance in any of these findings (p>0.05).

In reference to the histopathological findings, the most prevalent in diabetics was pan- gastritis in 56.8% (67/118) and for non-diabetics was antral gastritis in 66.1% (78/118). Correlation yielded a p value of <0.001 for both groups equally, proving that diabetes mellitus is correlated to pangastritis, while antral gastritis is statistically associated with a diabetes-free population. Measures of association were similar to those found in the endoscopy results; pangastritis correlated with the presence of DM (p <0.001), while antral gastritis correlated with healthy controls (p <0.001). In the study by Vaishnav et al., similar data were found where most of the patients with DM presented gastritis (76.87%). "Its cause can be attributed to mucosal changes due to poor glycemic control and diabetic

gastroparesis" [7]. Thus indicating that DM presents a risk of suffering from pangastritis.

Other histopathological findings included gastric ulcer with 25.4% (30/118) in DM and 16.1% (19/118) in non-diabetics. While duodenal ulcer in 3.4% (4/118) in DM and 0.8% (1/118) in non-diabetics, and Gastric Polyp with 6.8% (8/118) in DM and 4.2% (5/118) in non-diabetics. Presence of duodenitis 1.7% (2/118) in DM and 1.7% (2/118) in non-diabetics. Esophagitis with 4.2% (5/118) in DM and 3.4% (4/118) in non-diabetics.

In these results, gastric ulcer, duodenal ulcer, gastric polyp, duodenitis and esophagitis showed an Odds Ratio > 1. However, these findings did not show statistical significance (p > 0.05).

Finally, malignancy was present in 0% (0/118) of diabetic patients and 0.8% (1/118) in non-diabetics. Excluding a significant difference in both populations regarding the presence of malignancy. This demonstrates that diabetes is not an inclusion or exclusion criterion for the presence of carcinoma.

H. pylori infection was evaluated with histopathological results and a positive finding result of 95.8% (113/118) in diabetics and 96.6% (114/118) in non-diabetics was obtained. The Spearman P value used to correlate these data resulted in (p > 0.05), indicating that these data do not present statistical significance. These findings are associated in the same way with a report by Abboud et al. "Diabetes Mellitus is not significantly associated with

H. pylori infection" [6]. Similarly, Konur et al. states, "There is no significant difference observed between both diabetic and non-diabetic groups and H. pylori infection" [2].

Of the total number of patients with positive histopathology findings for gastritis, 227 (104 with a diagnosis of pangastritis and 123 with a diagnosis of antral gastritis) obtained positive biopsies for H. pylori infection, however there was no statistical significance in the relationship between gastritis and H. pylori (p > 0.05), findings consistent with those of Abboud et al. "It is well established in the literature that the most common cause of gastritis is H. pylori infection. However, in this study the relationship between H. pylori and endoscopic gastritis was not statistically significant" [6]. The same lack of statistical significance can be witnessed with the relationship between gastric (48 patients) and duodenal ulcers (5 patients) and H. pylori infection (p >0.05). "Although H. pylori infection was identified as the main cause of peptic ulcer, a statistically significant correlation with H. pylori was not found in our study" [6].

CONCLUSIONS

To conclude, dyspeptic symptoms are prevalent in diabetes mellitus. In this study, the most common age was between 55 and 69 years. The female gender was the most frequent. Epigastralgia was the most prevalent presenting symptom that led to upper endoscopy evaluation in patients with and without diabetes mellitus alike. The correlation between the reasons for upper endoscopy and the presence of diabetes mellitus was statistically significant screening.

When evaluating gastrointestinal tract pathologies by macroscopic changes observed during upper endoscopy, pangastritis, duodenitis, and peptic ulcer disease were more common in diabetic patients. While in non-diabetics antral gastritis was more prevalent. The correlation between macroscopic changes observed during upper endoscopy and diabetes mellitus demonstrated a significant relationship in antral gastritis, pangastritis and duodenitis.

Histopathological findings demonstrated that the most prevalent findings are pangastritis

and peptic ulcer disease in patients with diabetes mellitus and antral gastritis in non- diabetics. The correlation between histopathological findings and the presence of diabetes mellitus was positive for pangastritis and antral gastritis.

H.pylori infection was positive in most diabetics as well as non-diabetics. Most patients with both antral and universal gastritis tested positive for H. pylori. Likewise, patients with peptic ulcer disease were positive for the pathogen. There was no statistical significance regarding the correlations.

We recommend that further studies should be carried out to evaluate the strength of the relationship between upper GI tract pathologies and DM. We also recommend that when monitoring a patient diagnosed with diabetes mellitus, the presence of gastrointestinal symptoms that may suggest a gastrointestinal pathology be taken into account. In the same way, carry out a complete examination to initiate prophylaxis and/ or appropriate treatment seeking to prevent the emergence of any of the diseases or complications.

Only 11% of diabetic patients performed upper endoscopy as a screening, while the rest sought medical attention once symptoms were evident. Therefore, we recommend that general practitioners routinely establish endoscopy evaluation for all long-term diabetic patients, since even those evaluated by screening, positive findings were found in both endoscopy and biopsies.

CONFLICT OF INTEREST

The authors declare that there are no conflict of interests.

REFERENCES

MSP presenta resultados de estudio sobre prevalencia sobrepeso, hipertensión y diabetes - Ministerio de Salud Pública. msp. gob.do. https://msp.gob.do/web/?p=12216

Konur S. A relationship between endoscopic findings and diabetic regulation, and complications in patients with diabetes mellitus. Archives of Medical Science - Civilization Diseases. 2020;5(1):53-57. doi:https://doi.org/10.5114/amscd.2020.100979

Boland BS, Edelman SV, Wolosin JD. Gastrointestinal complications of diabetes. Endocrinology and Metabolism Clinics of North America. 2013;42(4):809-832. doi:https://doi.org/10.1016/j.ecl.2013.07.006

Bharucha AE, Kudva YC, Prichard DO. Diabetic Gastroparesis. Endocr Rev. 2019;40(5):1318-1352. doi:10.1210/er.2018-00161

Tseng PH., Lee YC., Chiu HM., et al. Association of Diabetes and HbA1c Levels With Gastrointestinal Manifestations. Diabetes Care. 2012;35(5):1053-1060. doi:https://doi.org/10.2337/dc11-1596

Abboud AA, Khalek WA, Abboud AA, Moussawi HAl, Rustom M, et al. (2017) Epidemiology of Helicobacter pylori Infection among Symptomatic Patients, Correlation with Endoscopic Findings and it's Association with Type II Diabetes Mellitus. J Gastroint Dig Syst 7: 503. doi: 10.4172/2161-069X.1000503

Vaishnav, Bhumika & Shaikh, Sameer & Bamanikar, Arvind & Kakrani, Arjun & Tambile, Rahul. (2018). Diagnostic Upper Gastrointestinal Endoscopy and Prevalence of Helicobacter Pylori Infection in Dyspeptic Type 2 Diabetes Mellitus Patients. Journal of Digestive Endoscopy. 09. 053-060. 10.4103/jde.JDE_10_18