Prevalence of Gastroesophageal Reflux Disease among Diabetic Patients at Sharif Medical City Hospital, Lahore, Pakistan

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Abstract

Background: Diabetes mellitus has been linked to various gastrointestinal motility disorders, including gastroesophageal reflux disease (GERD). This study aimed to determine the proportion of GERD in patients with diabetes mellitus.

Methods: This descriptive cross-sectional study was conducted at the medical outpatient department of Sharif Medical City Hospital, Lahore, from October to December, 2020. Patients previously diagnosed with type II diabetes were included using non-probability consecutive sampling, and the GERDQ questionnaire was used to determine the frequency. IBM SPSS statistics version 23 was used for the analysis of data.

Results: Of the 273 participants, 183 (67.0%) were male and the mean age was 51.13±12.8 years. The mean duration of diabetes was 6.97±4.76 years and oral hypoglycemic agents were used by 133 (48.7%) participants. Overall, 133 (48.7%) of the participants had GERD with a mean GERDQ score of 10.8(±1.4).

Conclusions: Almost half of the participants have GERD; the most common symptom is regurgitation of stomach contents. Awareness should be raised, and early screening should be done to prevent long-term complications.

Keywords: Diabetes mellitus, gastroesophageal reflux disease, GERDQ questionnaire, obesity, Pakistan

Introduction

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia, resulting from defects in insulin secretion, insulin action, or both. Insulin is an anabolic hormone that is released by the Islets of Langerhans in the pancreas. In pancreatic B cells, insulin secretion is stimulated by the alteration of cellular array of messenger molecules. Type 1 diabetes mellitus, also known as insulin-sensitive diabetes mellitus, results when the pancreas produces little or no insulin. Children between the age of 10 and 14 years old are most likely to develop it; whereas in type 2 diabetes mellitus, also called insulin resistant, the tissues resist the effects of insulin, followed by insufficient insulin production by the pancreas later in life. It occurs most often in middle-aged and older people, however, there has been an increase in the prevalence of type 2 diabetes mellitus among children.[1–3]

As in diabetes mellitus, long-term hyperglycemia is linked with a number of co-morbidities including cardiovascular diseases, nerve damage (neuropathy), renal disease, retinopathy, and skin conditions.[4] It is one of the causes of several gastrointestinal motility disorders, including gastroesophageal reflux disease (GERD) and gastroparesis. The mechanism of development of GERD in diabetics is multifactorial and is linked with obesity, neuropathy and hormonal imbalance of ghrelin and motilin. Obesity causes higher intra-abdominal pressure leading to hiatal herniation, which reduces lower esophageal tone and causes acid reflux. Diabetes induces neuropathy causes gastropathy and esophageal dysmotility.[5] Chronic gastroesophageal reflux disease can lead to Barrett's esophagus and esophageal adenocarcinoma as well as negatively affecting the patient's living conditions, productivity and sleep.[6]

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The worldwide prevalence of diabetes is 9.3%, and in Pakistan it is 14.6%.[7,8] The prevalence of GERD among the population of Pakistan ranges from 22–24%.[9,10] The aim of this study was to determine the frequency of GERD in the diabetic population as a recent meta-analysis showed that there is a significant association between diabetes and GERD.[11] This study is essential due to variations in frequencies of GERD in the diabetic population of different countries. Our study will fill the literature gap and help physicians in early detection and treatment of GERD and this will also reduce the risk of the development of Barrett's esophagus and esophageal adenocarcinoma.

Methods

It was a descriptive cross-sectional study conducted in medical outpatient department of Sharif Medical City Hospital, Lahore from October to December, 2020 after approval from the Ethics Committee of Sharif Medical and Dental College, Lahore (Ref No. SMDC/SMRC/138-20). The location of Lahore city on the map of Pakistan is shown in Figure 1. Sample size of 273 was calculated with the help of WINPEPI Statistical program, with confidence of 95% with acceptable difference of 0.05 and assumed proportion of 0.23.[12,13]

Patients previously diagnosed with type II diabetes were included using non-probability consecutive sampling. Patients with gestational diabetes mellitus, Crohn's disease, ulcerative colitis and diabetes insipidus were excluded. Informed consent was taken from the patients and GERDQ questionnaire was filled out on spot. It was a six-item, Likert scale-based questionnaire consisting symptoms in the last week which included frequency of heartburn, epigastric pain, nausea, sleep disturbance, regurgitation and use of additional medicine besides the prescribed ones. The presence of GERD was determined based on summing up the individual score of all questions and comparing the total with a cut-off value of 9, having a sensitivity of 66% and specificity of 64%.[14]

For analysis of data, SPSS version 23 was used. For quantitative variables, like age, BMI, duration of diabetes and GERDQ score, mean±SD were calculated. Frequency was calculated for qualitative variables like gender, education, and occupational status. Body mass index (BMI) cut-off values used to classify the nutritional status of participants were of the Asian population. The normal BMI range was 18.5–22.9 kg/m^2. Patients with BMI between 23–24.9 kg/m^2 were considered overweight and those with BMI greater than 25 kg/m^2 were obese.[15] Post-stratification chi-square was applied and value ≤0.05 was considered significant.

Figure 1 Location of Lahore on the Map of Pakistan*
*Source: Wikipedia/NordNordWest

Table 1 Sociodemographic Characteristics of Participants

Characteristics		Frequency (n)	Percentage (%)
Age group of participants (in years)	≤40	50	18.3
	41–50	46	16.9
	51–60	127	46.5
	61–70	44	16.1
	≥71	6	2.2
Gender	Male	183	67.0
	Female	90	33.0
Educational status	Primary	25	9.2
	Secondary	41	15.0
	Post-secondary	112	41.0
	Graduation/Higher	95	34.8
Occupational status	Employed	100	36.6
	Unemployed	173	63.4
Total family income (in PKR) 1 USD= 160PKR	<30,000	37	13.6
	30,000–50,000	37	13.6
	>50,000	199	72.8

Note: PKR= Pakistan Rupee

Results

There were 273 participants, of which 183 (67.0%) were male. The most common age group was between 51 to 60 years. Complete sociodemographic characteristics are shown in Table 1. The duration of diabetes in most subjects was between 5–10 years and they were Obese I. Almost half (48.7%) were using oral medications for glycemic control. History of smoking was absent in 258 (94.5%) and 94 (34.4%) exercised regularly and were following nutritional recommendations offered by their physicians. Among the other medications used by participants, the most common were anti-hypertensives which were being used by 43 (15.8%). Clinical characteristics of participants and their comparison between those with and without GERD are shown in Table 2.

The participants had an average GERDQ score of 8.96 (±2.1). GERD was present in 133 (48.7%) participants with a mean score of 10.8 (±1.4). The most common symptom in the study was regurgitation of stomach contents and night sleep disturbance; the frequency of symptoms is shown in Table 3.

Discussions

The frequency of GERD in diabetics is greater when compared with that of the normal population of America (18.1% to 27.8%), Europe (25.9%), Australia (11.6%) and Nigeria (7.6%).[16–19] Diabetics also have a higher frequency of GERD than the general population of Asian countries, including Pakistan, supporting that diabetes-associated induced neuropathy could be the cause of GERD in diabetic population.[9,10,20,21]

The result of the study is close to those conducted in America and Saudi involving diabetic population.[22,23] However, the frequency of GERD in diabetics in the study is greater than those of Indonesia, China and Mexico.[24–26] GERD frequency in Indonesian diabetics is 30.2% and is less than the frequency among participants of this study. This could be due to the fact that the mean BMI (24.07 ± 4.32 kg/m^2) of the participants and the duration of diabetes (median=2 years) is less than that of our study (BMI=28.4 ± 5.18 kg/m^2, median duration=6 years).[24] Mexican study also showed less frequency, this could be possibly due to racial and geographical factors.[25] In Chinese study, a different questionnaire (Reflux Disease Questionnaire) was used which could be accountable for the differences in results.[26]

Studies conducted in Turkey and Bangladesh showed increased frequency of GERD in diabetics compared to this study.[27,28] This could be because the study conducted in Bangladesh only involved participants admitted in hospital and among those, most of them had co-morbidities.[27] Whereas, a self-devised questionnaire was used in Turkish study which could have led to the differences in results of both studies.[28]

Table 2 Clinical Characteristics of Participants with and without GERD (n= 273)

Clinical Characteristics		GERD (n)	Non-GERD (n)	X^2	p-value
Nutritional status (BMI)	Normal range (18.5–22.9)	6	18	44.67	<0.001
	Overweight at risk (23–24.9)	43	8		
	Obese I (25–29.9)	39	79		
	Obese II (≥30)	45	35		
Duration of diabetes (years)	<5	33	52	10.98	0.004
	5–10	88	65		
	>10	12	23		
Diet control	Yes	109	116	0.38	0.84
	No	24	24		
Exercise	Yes	67	52	4.85	0.028
	No	66	88		
Medication for diabetes	None	9	20	9.19	0.007
	Oral medication	77	56		
	Oral medications and insulin	47	64		

Table 3 Frequency of GERD Symptoms among the Participants

Symptoms	0 Day (Never) n (%)	1 Day (Mild) n (%)	2–3 Days (Moderate) n (%)	4–7 Days (Severe) n (%)
Heartburn	94 (34.4)	69 (25.3)	74 (27.1)	36 (13.2)
Acid regurgitation	78 (28.6)	92 (33.7)	82 (30.0)	21 (7.7)
Stomach pain or discomfort	121 (44.3)	46 (16.8)	83 (30.4)	23 (8.4)
Nausea	145 (53.1)	63 (23.1)	57 (20.9)	8 (2.9)
Night sleep disturbance	83 (30.4)	65 (23.8)	87 (31.9)	38 (13.9)

There is a higher proportion of individuals between the ages of 51 and 60 years old, suggesting that the majority of diabetes-related comorbidities begin to manifest in this age range, resulting in frequent hospital visits. The higher number of male participants in the study could be due to the limited access of women in rural areas to tertiary care hospitals and their reliance on male family members for transportation. This could be a contributor to the gender disparity in the study. There was a higher number of participants with diabetes for more than five years who had symptoms of GERD compared to those with diabetes for less than five years, indicating that an increased duration of diabetes may be a contributing factor, as observed in other studies.[11] However, the results were not consistent for those with a duration of diabetes greater than 10 years due to the small number of participants in this group.

The limitations of this study included a small sample and being limited to a single site. More hospitals could have been involved to have a large number of patients and to have patients from different localities. The latest studies in this regard should be done using 24-hour esophageal pH monitoring and manometry.

In conclusion, awareness regarding GERD symptoms should be raised in diabetics as almost half of the participants had GERD in the study. The most common symptom being regurgitation of stomach contents and sleep disturbance. Screening should be done to devise early strategy and management. This could lower the risk of development of complications of GERD.

Disclaimer: None

Conflict of Interests: None to declare.

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