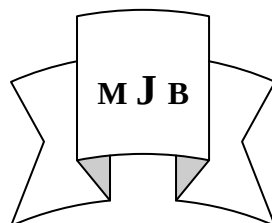


Functional Disturbances of the General Gastrointestinal Tract in Diabetes Mellitus

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Abstract

Background: Diabetes mellitus is a common metabolic disorder with significant impact on morbidity and mortality. The various diabetic complications including GI dysfunction have been widely studied and documented.

Objective: To assess the prevalence of GI symptoms in diabetic patients in Al-Najaf city.

Methods: A prospective case controlled questionnaire-based study surveys the prevalence of symptoms of GI dysfunction in 100 diabetic patients and 70 non-diabetic subjects.

Results: The prevalence of GI symptoms in the diabetic and control subjects was 40% and 12% respectively. The common symptoms were constipation, belching, epigastric pain and diarrhea.

Conclusion: The prevalence of GI symptoms is higher in diabetics than control.

Poor control and longer duration of DM are associated with significant increase in the prevalence of GI symptoms in diabetic patients.

الاضطرابات الوظيفية للجهاز الهضمي لدى مرضى داء السكري

الخلاصة:

تهدف هذه الدراسة الى الكشف عن مدى انتشار اعراض الجهاز الهضمي الوظيفية لدى ١٠٠ مريض بداء السكري من النوع الاول و الثاني، بالإضافة الى ٧٠ شخصا غير مصاب بالسكري.

اظهرت النتائج وجود اعراض الجهاز الهضمي الوظيفية عند ٤٠% من مرضى السكري و ١٢% من الاشخاص الاصحاء و هو فرق ذو دلالة معنوية.

Introduction

Diabetes mellitus is a chronic disorder characterized by impaired metabolism of glucose and other energy yielding fuels as well as by late development of vascular and neuropathic complications[1].

In general gastrointestinal (GI) symptoms and dysfunction caused by DM have been under recognized. The GI complications of DM often involve the esophagus, stomach, gallbladder, intestines, and the pancreas. The symptoms include constipation, faecal incontinence, heartburn, abdominal pain, diarrhea and nausea/vomiting. These have been attributed to altered

intestinal motility and augmented visceral sensitivity in different regions of the gastrointestinal tract (GIT) resulting from autoimmune neuropathy, neuroendocrine transmitter imbalance and microangiopathy [2, 3].

Reports of prevalence of GI symptoms in diabetics have ranged from 19-76% with consequent negative impact on health related quality of life in them[4]. Distribution of symptoms has been reported to be similar in type 1 and 11 diabetics but more frequent in poorly controlled diabetics [5].

One hypothesis that explains how hyperglycemia might lead to the chronic complications of DM is that

increased intracellular glucose leads to the formation of advanced glycosylation end products (AGEs) via the nonenzymatic glycosylation of cellular proteins resulting from the interaction of glucose with amino-groups of proteins. AGEs have been shown to cross links proteins (e.g collagen) and accelerate atherosclerosis, promote glomerular dysfunction, reduce nitric oxide synthesis, induce endothelial dysfunction and alter extracellular matrix composition and structure. The serum level of HbA1c correlates with the level of glycaemic control. The clinical implication of HbA1c is that the goal of therapy is to achieve an HbA1c level as close to normal as possible to prevent many of the early complications of DM [6].

Patients and Method

This was a prospective questionnaire based case-control study conducted among previously diagnosed diabetic patients attending the Diabetic Clinic in Al- Hakim Center for Treatment and Research of DM in Al-Sader Teaching Hospital in Al-Najaf for a period of five months starting in February 2008.

One hundred diabetic patients of type1 and type 2 DM were enrolled in the study. Duration of DM illness, the type of treatment and the degree of blood sugar control were noted. The mean of fasting blood glucose measurements were considered as an indicator of the control of DM instead of HbA1c because of lack of this test in the center.

Diabetic control was judged good if the mean FBS over a period of 3-months was less than 140 and poor if above this range.

A group of 70 non-diabetic subjects from the relative of the

patients are used as control, they were sex and age matched with diabetic group. DM is excluded by measuring blood glucose.

Interviewer based questionnaires were administered for diabetics and control group to elicit presence or absence of nine listed GI symptoms of sufficient severity to interfere with daily routine within the preceding 3 months.

GI symptoms are classified into upper GI symptoms (easy fullness, nausea, vomiting, epigastric pain, heart burn, belching, and abdominal bloating) and lower GI symptoms (diarrhea, constipation).

The statistical tests used have included student's test and chi-square test.

Results

The patients with DM were 100 in number and the controls were 70 in number. The age range of the diabetics and control subjects were 20-55 years (44.5 ± 10) and 18-45 years (40.3 ± 14) respectively while the female: male ratio in diabetic and control subject was 2:1 and 1.5:1 respectively.

Forty diabetics (40%) and 12 control subjects (17%) had one or more symptoms of GI dysfunction ($P < 0.05$). The commonest gastrointestinal symptoms in the diabetics were constipation 30%, belching 25%, epigastric pain 24%, and diarrhea 22%. (table 1).

Among the diabetic patients the mean duration of the diabetic illness was 4.5 ± 3.5 years. The presence of the gastrointestinal symptoms was significantly associated with the degree of diabetic control and duration of DM but there was no significant effect of type of treatment. (table 2)

Table 1 GI symptoms in diabetic patients and the control group.

Symptoms	Diabetic no. (%)	control % no. (%)
Easy fullness	17 (17%)	2 (2.8%)
Nausea	20 (20%)	4 (5.7%)
Vomiting	2 (3%)	0 (0%)
Epigastric pain	24 (24%)	7 (10%)
Heart burn	10 (10%)	3 (4.3%)
Belching	25 (25%)	5 (7.1%)
Bloating	15 (15%)	4 (5.7%)
Diarrhea	22 (22%)	5 (7.1%)
Constipation	30 (30%)	7 (10%)
Total no with GI symptom	40 (40%)	12 (17%)

$P < 0.05$

Table 2 GI symptoms in diabetic patients in relationship to treatment, duration and glycaemic control using chi square test

The variable	Presence of GI symptoms	Absence of GI symptoms	P- value
Treatment type			
Insulin	7	10	>0.05
OHA	33	50	
Control of DM			
Good	5	13	<0.05
Poor	35	47	
Duration of DM			
≤ 5 years	15	25	< 0.05
> 5 years	25	35	

Discussion

Diabetes mellitus is often associated with GI symptoms, but the exact pathogenesis remains unresolved. The scope of reported GI features in DM range from upper gastrointestinal symptoms, dysmotility to symptoms of anorectal dysfunction[7].

It is now recognized that acute changes in blood glucose concentration have substantial and reversible effect on gastric as well as esophageal, intestinal, gallbladder and anorectal motility, in both healthy subjects and patients with DM[8]. Animal studies

have demonstrated that the presence of glucose responsible neurons in central nervous system may modify vagal efferent activity[9].

Some researchers have suggested that GI symptoms in DM may actually be related to DM neuropathy which tend to occur after several years of the DM illness (mean=8yrs.)[10].

In this study GI symptoms were present in 40% of the diabetic patients. Though these features may reflect sensori-motor abnormalities of the GI tract which are common in DM, the symptoms are however non-

specific and may relate to other GI disorders not necessarily DM-related[5]. However the severity of these sensori-motor disturbances when they occur has been reported to correlate with symptoms manifestations[11].

The upper GI symptoms in this study could be manifestations of dyspepsia or reflux disease in the diabetic patients. Lluch et al had reported a gastroesophageal reflux disease (GERD) prevalence of 28% in diabetics using 24hour ambulatory Ph monitor[12].

Schvarcz et al from Sweden conducted a similar study of 110 type1 diabetic patients had found a significant increase in prevalence of lower GI symptoms in diabetic patients compared to normal subjects but not for upper GI symptoms. Also they noted significant relation between high level of HbA1c and frequency of GI symptoms and duration of DM [13].

Conclusion

GI symptoms are more common in diabetic patients compared to normal subjects. Poor control and longer duration of DM associated with significant increase in the prevalence of GI symptoms in diabetic patients.

It is hoped that this study will raise the awareness of clinicians to the GI dysfunction in diabetics and enable their early recognition when they occur.

References

1. Silvio E; Robert S. Type 1 DM. Goldman Cecil Medicine. 23rd edition. 2007. Ch. 247
2. Rothstein RD Gastrointestinal motility disorders in diabetes mellitus. Am J Gastroenterol 1990; 85 (7): 782-785.
3. Jing B Z, Jens B F, Asbjorn M D. Upper gastrointestinal sensory-motor dysfunction in diabetes mellitus. World J gastroenterology 2006; 12(18): 2846-2857.
4. Talley NJ, Young L, Bytzer P, Hammer J, Leemon M, Jones M, Horowitz M. Impact of chronic gastrointestinal symptoms in diabetes mellitus on health related quality of life. Am J Gastroent 2001; 96(1) 71-76
5. Bytzer P, Talley NJ, Hammer J, Young LJ, Jones MP, Horowitz M. GI symptoms in diabetes mellitus are associated with both poor glycaemic control and diabetic complications. Am J Gastroenterol 2002; 97(3): 604-611
6. Alvin C, Powers. Diabetes Mellitus. Harrisons Internal Medicine. 15th Edition 2001, 2110- 2120.
7. Talley NJ, Howell S, Jones MP, Horowitz M. Predictors of turnover of lower gastrointestinal symptoms in diabetes mellitus. Am J Gastroenterol. 2002; 97(12): 2944-2945
8. Cucchiara S, Franzese A, Salvia G, Alfonsi LJ, Vela VD, Montisci A et al. Gastric emptying delay and gastric electrical derangement in IDDM. Diabetes Care 1998; 19:438-443.
9. Mizuno Y, Oomura Y. Glucose responding neurons in the nucleus tractus solitarius of the rat: in vitro study. Brain Res 1984; 19:109-116.
10. Savettieri G, Rocca WA, Salemi G, Meneghini F et al. Prevalence of diabetic neuropathy with somatic symptoms: a door to door survey in two Sicilian municipalities. Sicilian Neuro-epidemiology study (SNES) Group. Neurology 1993; 43:1115-1120.
11. Rosztoczy A, Roka R, Varkonyi TT, Lengyel C, Izbeki F, et al. Regional differences in the manifestation of gastrointestinal motor disorders in Type 1 diabetic patients with autonomic neuropathy. Gastroenterology 2004; 126(11): 1295-1300
12. Lluch I, Ascaso JF, Mora F, Minguez M, Pena A, et al.

Gastroesophageal reflux in diabetes mellitus. Am J Gastroenterol 1999; 94(4): 919-924

13. SchvarcZ-E, Palmer- M;lngberg CM; Aman-J; Brcne-C. Increased

prevalence of upper gastrointestinal symptoms in long term type 1 diabetes mellitus. Diabet med. 1996 May , 13(5):478-81