

# Recent Trends of GI Symptoms in Diabetic Population in Eastern India: An Original Article

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## ABSTRACT

Gastrointestinal complications in diabetes are related to autonomic neuropathy. Till date, most of the established literatures have shown that these complications and symptoms are more prevalent in diabetic population compared to non diabetic control groups. These studies are mostly of western world origin. On the other hand, many studies have failed to show such an association. The numbers of such studies are very limited in India, particularly in Eastern India. We have tried to determine the association and the influences of diabetes on GI symptoms.

**Keywords:** GI symptoms, diabetes, Eastern India

## INTRODUCTION

Diabetes is now a worldwide epidemic. Not less than 366 million of world populations are diabetic.<sup>(1)</sup> GI symptoms in diabetes occur due to autonomic neuropathy.<sup>(2,3)</sup> Autonomic neuropathy affecting the esophagus and remodeling of the muscles of it may cause abnormal peristaltic contractions including spontaneous ones, also the tone of LES is lowered.<sup>(4)</sup> Esophageal dysmotility manifests as dysphagia and heartburn as a result of gastroesophageal reflux, although in a very less number of such patients.<sup>(5)</sup> Poor glycemic control and longer duration of the disease predispose more to GERD in diabetes.<sup>(6)</sup>

Gastroparesis is one of the most common complications of the GIT in diabetes.<sup>(7)</sup> It may cause nausea, vomiting, pain abdomen, early satiety, bloating etc. it may alter the physiologic relation between

carbohydrate absorption and action of insulin, due to which, controlling of diabetes becomes difficult including frequent episodes of hypoglycemia or alternating hypo and hyperglycemic spells.

Small bowel and colonic complications are also common. They can manifest as diarrhea, constipation etc and are especially common in those who have gastroparesis.<sup>(8)</sup> In diabetic patients, alternate constipation and diarrhea is one of the most common symptoms of gastropathy. Diarrhea is most often painless and more commonly nocturnal.<sup>(9)</sup> Poor glycemic control and peripheral and autonomic neuropathy are characteristically associated with diabetic diarrhea.<sup>(10)</sup> It may also occur due other cause like metformin, exocrine pancreatic insufficiency, bile acid malabsorption etc., which must be excluded before attributing it to autonomic neuropathy. Acute hyperglycemia increases

the risk of fecal incontinence, <sup>(11)</sup> which is due to external sphincter inhibition and reduced rectal compliance. Fecal incontinence, like diarrhea, is also mainly nocturnal.

Hepatic complications include NAFLD, comprising of non alcoholic fatty liver (NAFL) and NASH. It is a complication of metabolic syndrome. <sup>(12)</sup> Patients with NAFLD in diabetes may be asymptomatic, or may have non specific or vague symptoms like vague RUQ pain, malaise etc. it may progress to decompensated chronic liver disease and cirrhosis. In fact, NAFLD is the most common cause of chronic liver disease in North America.

Glycogenic hepatopathy is one special condition seen in patients with poorly controlled long standing type 1 diabetes occurring due to glycogen overload in the liver. <sup>(13)</sup> It may clinically manifest

with nausea, vomiting, abdominal pain and derangements of LFT.

In our study, we have estimated the prevalence of GI symptoms like reflux, heart burn, anorexia, nausea, early satiety, bloating, diarrhea, constipation and pain abdomen in general population and diabetic people and tried to show any difference in prevalence between the two groups, as well as any change in prevalence of these symptoms in diabetic population in respect to age of the patients and duration of diabetes.

## MATERIALS AND METHODS

The study has been conducted on the patients attending OPD and IPD of General Medicine in College of medicine & JNM Hospital, Kalyani, a tertiary care centre based in Eastern India during August-September 2019.

Groups	Number of subjects	Inclusion criteria	Exclusion criteria
Case	240 males & 240 females	1. Diabetic person with age 18yr or above	1. Persons without diabetes 2. Diabetic persons below 18yr 3. Persons with mental illness and unable to communicate properly
Control	240 males & 240 females	1. Any person with age 18 or above	1. Persons with diabetes 2. Non diabetic persons below 18yr 3. Persons with mental illness and unable to communicate properly

### Defining criteria for cases-

Symptoms of diabetes and random blood glucose  $\geq 200$  mg/dl, or

Fasting plasma glucose  $\geq 126$  mg/dl, or

HbA1c  $\geq 6.5\%$ , or

2 hr plasma glucose  $\geq 200$  mg/dl during an OGTT with 75 g anhydrous glucose.

GI symptoms definition for cases and controls-

All the symptoms are assumed to be present if they are present for at least 4 weeks and at least 1 day per week.

Reflux- regurgitation of gastric contents into the mouth without nausea or vomiting

Heartburn- a discomfort or burning sensation behind the sternum arising in the epigastrium which may radiate to the back

Anorexia- loss of appetite

Nausea- an urge to vomit

Vomiting- a forceful regurgitation of the gastric content preceded by nausea and associated with retching

Early satiety- sensation of fulfillment before taking the usual amount of food for the age, sex and physical activity

Bloating- a sensation of abdominal distension. Measurable distension is not needed

Diarrhea- a decrease in stool consistency or increase in stool volume or frequency or combination of any of these 3 symptoms

Constipation- difficulty and/or infrequent passing of stool.

Data generated thereby are tabulated in Microsoft Excel sheet and prevalence calculated manually.

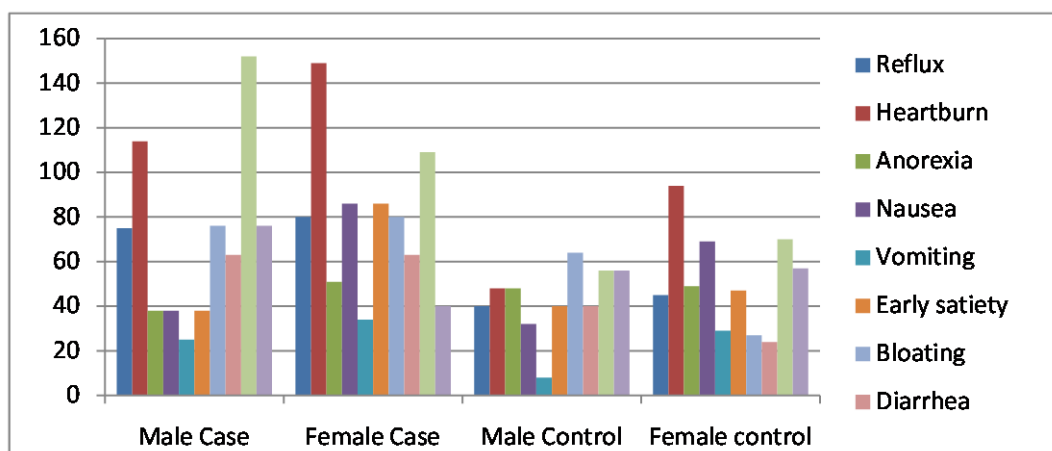
**Statistical analysis:**

Being a descriptive study, we have calculated the prevalences and other data by simple calculator, without using any softwares.

## RESULTS

**Table 1: Absolute number of male and female cases and controls having GI symptoms.**

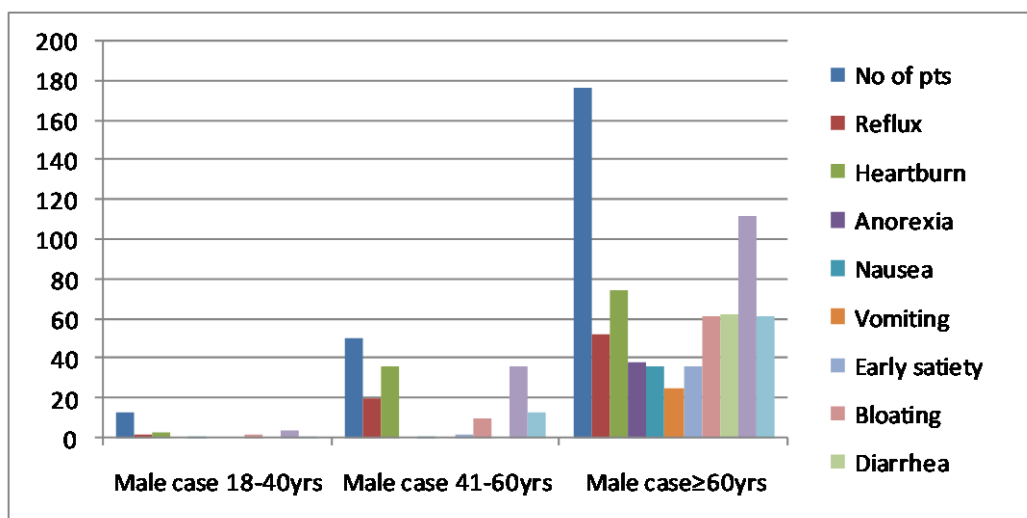
Groups	No. of pts	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
Male case	240	75	114	38	38	25	38	76	63	152	76
Female case	240	80	149	51	86	34	86	80	63	109	40
Male control	240	40	48	48	32	8	40	64	40	56	56
Female control	240	45	94	49	69	29	47	27	24	70	57



**Bar diagram 1: Absolute number of male and female cases and controls having GI symptoms.**

**Table 2: Male cases of different age groups with GI symptoms.**

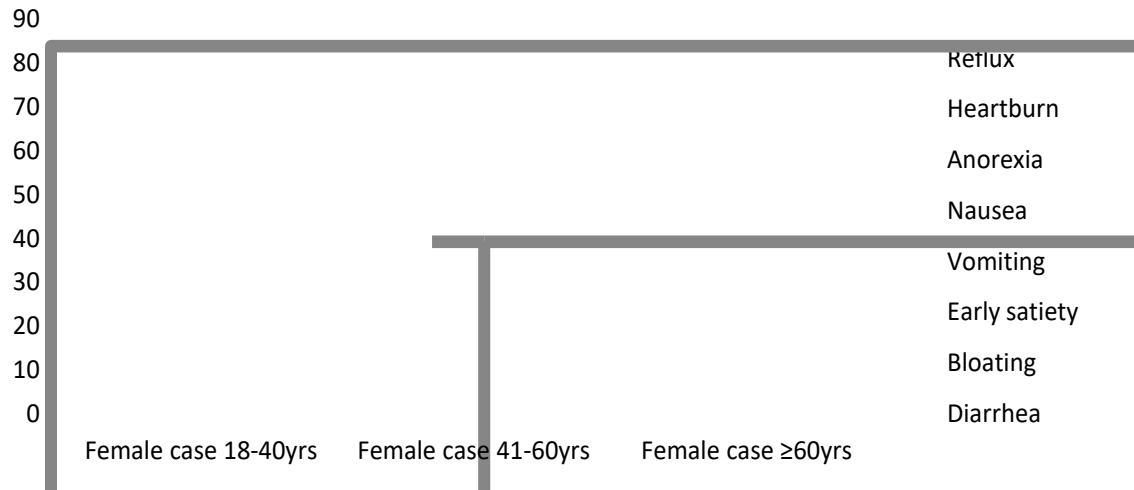
Male case by age in yrs	No. of pts	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
18-40yrs	13	2	3	0	1	0	0	2	0	4	1
41-60yrs	50	20	36	0	1	0	2	10	0	36	13
≥60yrs	177	53	75	38	36	25	36	62	63	112	62



**Bar diagram 2: Absolute number cases of different age groups with GI symptoms.**

**Table 3: Female cases of different age groups with GI symptoms.**

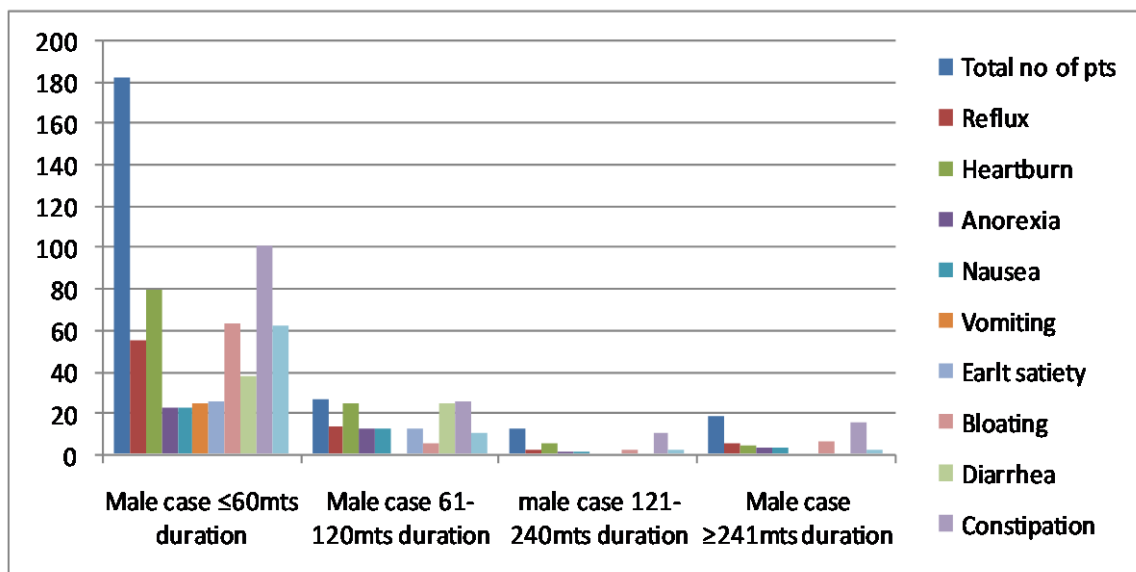
Female case by age in yrs	No of pts	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
18-40yrs	46	5	29	9	17	17	10	10	0	6	0
41-60yrs	137	58	85	15	46	11	61	55	48	80	34
≥60yrs	57	17	35	27	23	6	15	15	15	23	6



**Bar diagram 3: Absolute number of female cases of different age groups with GI symptoms.**

**Table 4: Male cases of different duration of diabetes with GI symptoms.**

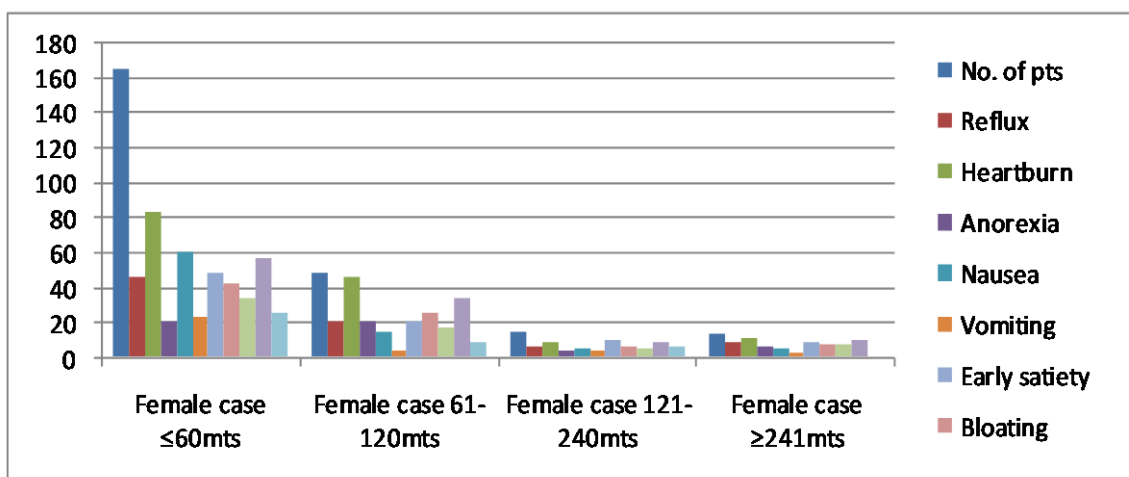
Male case duration in months	No of pts	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
≤60mts	183	55	80	22	22	25	26	63	38	101	62
61-120mts	27	13	25	12	12	0	12	5	25	26	10
121-240mts	12	2	5	1	1	0	0	2	0	10	2
≥241mts	18	5	4	3	3	0	0	6	0	15	2



**Bar diagram 4: Absolute number of male cases of different duration of diabetes with GI symptoms.**

**Table 5: Female cases of different duration of diabetes with GI symptoms.**

Female case duration in months	No of pts	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
≤60mts	165	46	83	20	61	23	48	42	34	57	25
61-120mts	48	20	46	21	15	4	20	25	17	34	9
121-240mts	14	6	9	4	5	4	10	6	5	8	6
≥241mts	13	8	11	6	5	3	8	7	7	10	0



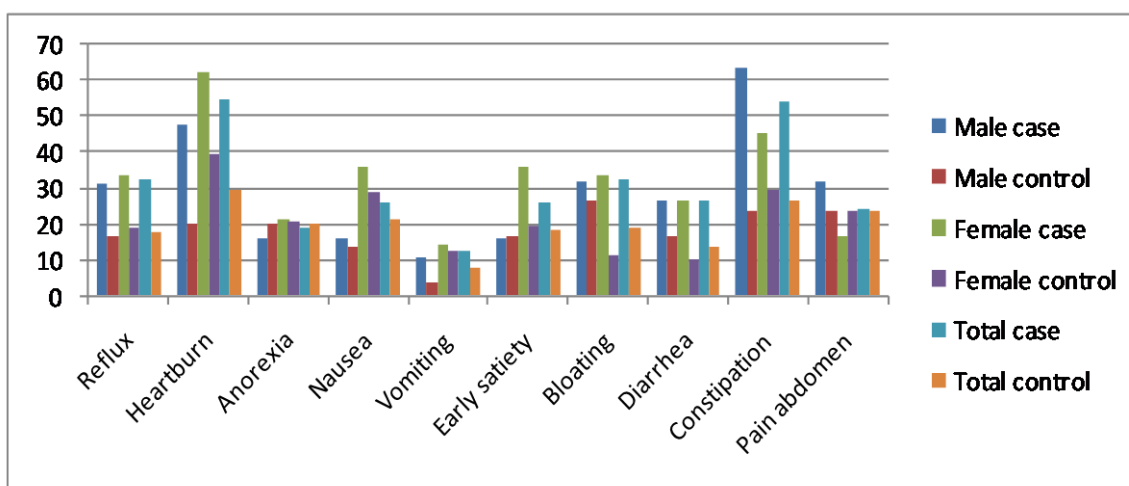
**Bar diagram 5: Absolute number of female cases of different duration of diabetes with GI symptoms.**

**Table 6: Percent prevalence of GI symptoms amongst cases.**

Prevalence %	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
Male case	31.25	47.5	15.83	15.83	10.41	15.83	31.67	26.25	63.33	31.67
Female case	33.33	62.08	21.25	35.83	14.17	35.83	33.33	26.25	45.41	16.67
Total case	32.29	54.79	18.54	25.83	12.29	25.83	32.5	26.25	54.37	24.16

**Table 7: Percent prevalence of GI symptoms amongst controls.**

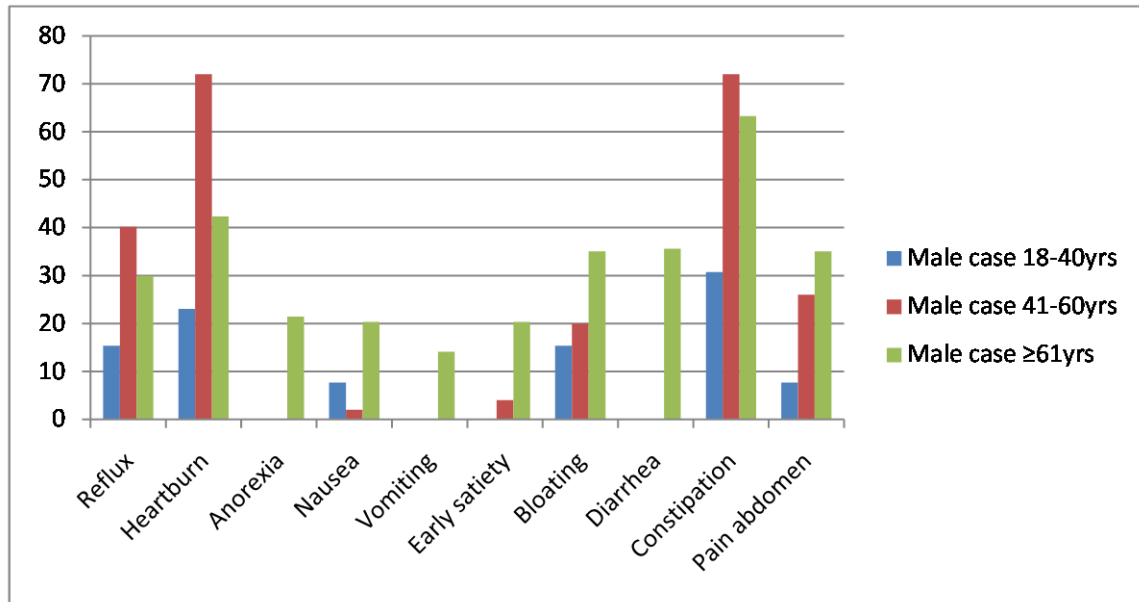
Prevalence %	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
Male control	16.67	20	20	13.33	3.33	16.67	26.67	16.67	23.33	23.33
Female control	18.75	39.17	20.42	28.75	12.08	19.58	11.25	10	29.17	23.75
Total control	17.71	29.58	20.21	21.04	7.71	18.13	18.96	13.34	26.25	23.54



**Bar diagram 6: Comparison of prevalence of GI symptoms between cases and controls.**

**Table 8: Percent prevalence of GI symptoms in different age groups of male cases.**

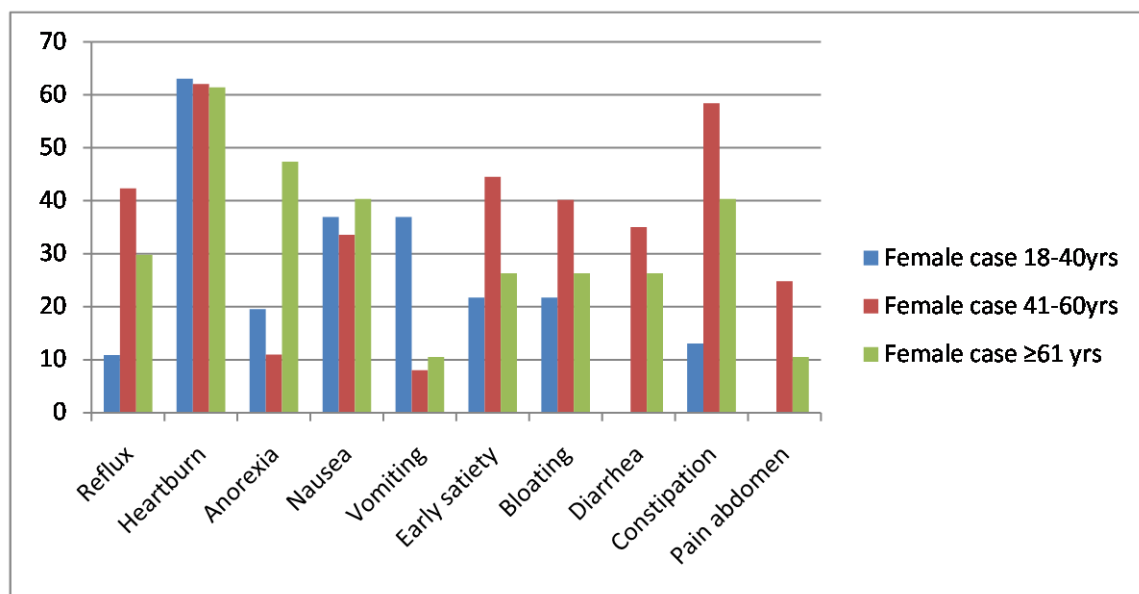
Male case Prevalence of GI syptoms→ Age in yrs↓	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
18-40	15.38	23.08	0	7.69	0	0	15.38	0	30.77	7.69
41-60	40.2	72	0	2	0	4	20	0	72	26
≥61	29.94	42.37	21.47	20.34	14.12	20.34	35.03	35.59	63.28	35.03



**Bar diagram 7: Percent prevalence of GI symptoms in different age groups of male cases.**

**Table 9: Percent prevalence of GI symptoms in different age groups of female cases.**

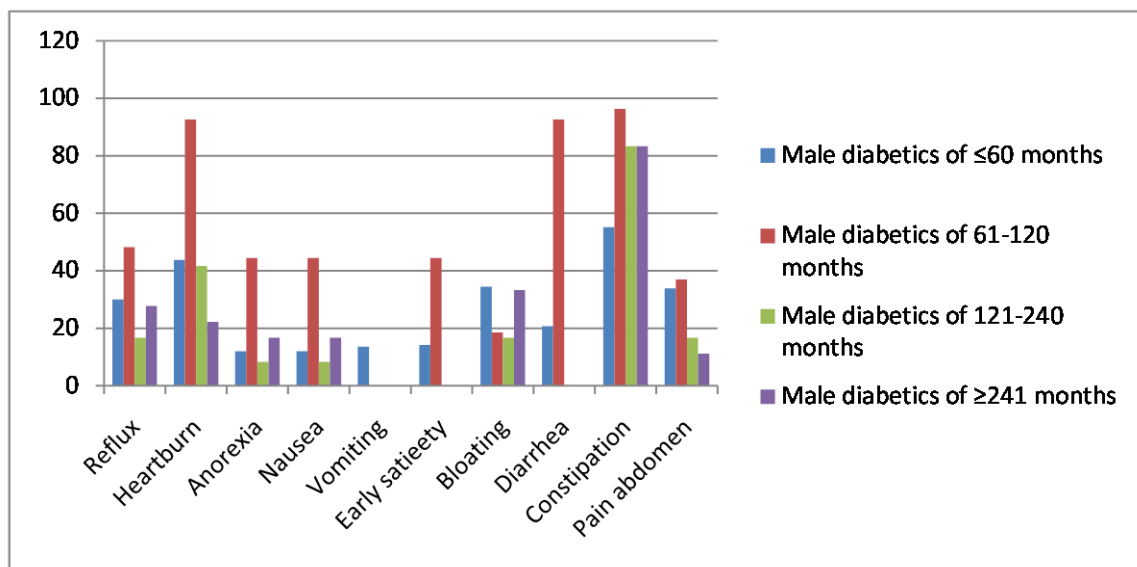
Female case Prevalence of GI syptoms→ Age in yrs↓	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
18-40	10.87	63.04	19.57	36.96	36.96	21.74	21.74	0	13.04	0
41-60	42.34	62.04	10.95	33.58	8.03	44.53	40.15	35.04	58.39	24.82
≥61	29.82	61.4	47.37	40.35	10.53	26.32	26.32	26.32	40.35	10.53



**Bar diagram 8: Percent prevalence of GI symptoms in different age groups of female cases.**

**Table 10: Percent prevalence of GI symptoms in male cases according to duration of diabetes.**

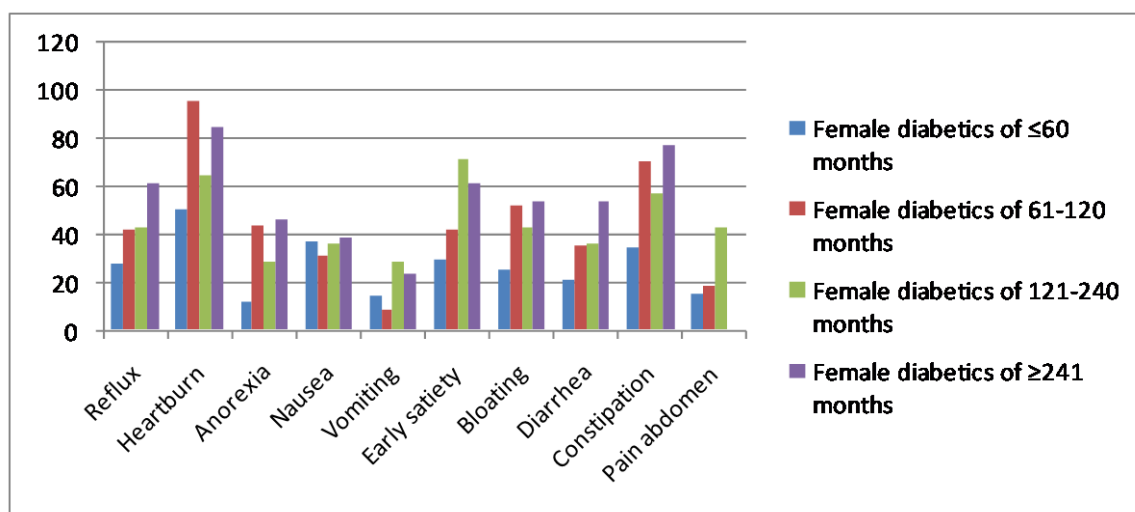
Male case Prevalence of GI symptoms→ Duration of diabetes in months↓	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
≤60mts	30.05	43.72	12.02	12.02	13.66	14.21	34.43	20.77	55.19	33.88
61-120mts	48.19	92.59	44.44	44.44	0	44.44	18.52	92.59	96.3	37.04
121-240mts	16.67	41.67	8.33	8.33	0	0	16.67	0	83.33	16.67
≥241mts	27.78	22.22	16.67	16.67	0	0	33.33	0	83.33	11.11



**Bar diagram 9: Percent prevalence of GI symptoms in male cases according to duration of diabetes.**

**Table 11: Percent prevalence of GI symptoms in female cases according to duration of diabetes.**

Female case Prevalence of GI symptoms→ Duration of diabetes in months↓	Reflux	Heartburn	Anorexia	Nausea	Vomiting	Early satiety	Bloating	Diarrhea	Constipation	Pain abdomen
≤60mts	27.88	50.3	12.12	36.97	13.94	29.09	25.45	20.61	34.55	15.15
61-120mts	41.67	95.83	43.75	31.25	8.33	41.67	52.08	35.42	70.83	18.75
121-240mts	42.86	64.29	28.57	35.71	28.57	71.43	42.86	35.71	57.14	42.86
≥241mts	61.54	84.62	46.15	38.46	23.08	61.54	53.85	53.85	76.92	0



**Bar diagram 10: Percent prevalence of GI symptoms in female cases according to duration of diabetes.**

## DISCUSSION

We included total 480 cases and 480 controls, with equal number of male and female subjects in each groups. From tables 6 & 7, it is evident from our study that all the GI symptoms are of higher prevalence amongst cases except anorexia and pain abdomen. Where there is no big difference in pain abdomen between cases and controls, the prevalence of anorexia was actually higher in control groups, or lower in diabetic population. This may be due to availability of better drugs like DPP4I or SGLT2I, or due to better awareness regarding glycemic control and preventing complications amongst diabetic population. The finding regarding prevalence of pain abdomen nearly correlates with that of Janatuinen et al, <sup>(14)</sup> showing similar prevalence of upper GI symptoms including pain abdomen among diabetic and non diabetic populations.

Another trend noticeable from our study is that, early satiety is also a relatively lesser prevalent symptom in male diabetics, whereas it is of much higher prevalence compared to both female non diabetic controls and overall control group.

Among diabetic subjects, diarrhea is of equal frequency in both males and females. Constipation and pain abdomen are of higher prevalence among male diabetics, whereas all other GI symptoms are more prevalent in female diabetics.

Overall average prevalence of GI symptoms in diabetic cases, male cases and female cases were 30.69%, 28.96% and 32.41% respectively. Among non diabetic controls the overall prevalence were 19.65%, 18% and 21.29%. This finding is also in the line of what many study have found that these symptoms are higher in diabetic population. <sup>(15-17)</sup> One literature showed prevalence of gastroesophageal reflux symptoms in diabetic population to be as high as 41%. <sup>(18)</sup> Whereas in our study it is found to be 32.29%. We hypothesize the lower prevalence of this in Eastern India may be due to low amount of

junk/processed/refluxogenic food compared to the Western world.

Among male diabetics, prevalence of all symptoms are higher in higher age groups except reflux, heartburn and constipation, which are higher in the middle-age group than older people. In the contrary, middle aged female diabetic population shows the major prevalence of GI symptoms except heartburn, which is more common in young-age group diabetic. This aspect of the study has to be further explored in Eastern India through other follow up researches.

Among male diabetics, GI symptoms are found to be most prevalent among those whose disease is of 5-10yrs duration except bloating, the prevalences of which are almost near to each other in patients with diabetes of less than 5 yrs and more than 20 yrs duration.

Among female diabetics, except vomiting, early satiety and pain abdomen, all other GI symptoms are most prevalent in those having diabetes for more than 20 yrs.

A study from Hong Kong showed that all the GI symptoms are of higher prevalence among diabetics, the only variable related directly to it was the disease duration according to that study. <sup>(16)</sup> Our study has found a mixed pattern of prevalence according to disease duration. We hypothesize that to be due to other factors influencing current GI symptomatology, to be explored further in this part of India.

## CONCLUSION

It is evident from our study that, GI symptoms overall are more prevalent in diabetic population than non diabetic ones.

A new trend has emerged from the current study showing that these symptoms are not entirely directly related to the age of the patients or duration of diabetes. The trend has to be confirmed or challenged further by follow up studies, and the causes are to be determined.



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