

Study to Find Prevalence Rate of Constipation among Diabetic and Non-diabetic Population

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ABSTRACT

Constipation is a relatively common complaint among people living with diabetes. Diabetes can cause constipation either directly or indirectly. Diabetes can lead to persistently high blood sugar levels, which may cause nerve damage that can result in constipation. In some cases, a person's diet or medication may also cause constipation. People living with diabetes may develop diabetic neuropathy. Diabetic neuropathy is nerve damage that can affect different parts of the body, including the digestive tract. Diabetes-related nerve damage may affect the vagus nerve, which controls the movement of food through the digestive tract. When this occurs, a person's bowels cannot process solid waste as effectively. As a result, a person may become constipated. Damage to the vagus nerve can also cause a condition called gastro paresis, which people sometimes refer to as delayed gastric emptying. A person with diabetes may develop constipation due to their diet. It is important that people with diabetes eat a well-balanced diet to prevent blood sugar spikes and maintain a healthy body weight. The purpose of this study was to determine the frequency of constipation in people with diabetes seen at a district hospital record. A cross-sectional study was conducted at Udham Singh Nagar District of Uttarakhand. Constipation was shown to be common among diabetes individuals in 80 percent of the 350 participants studied. Males outnumbered females in the sample (relative risk 4:1), as well as in terms of constipation frequency (80.2 percent). Constipation was linked to poor glycemic control (HbA1c ≥ 7) in 112 participants. In comparison to the general population, persons with diabetes mellitus who met the Rome III criteria had a higher rate of constipation. Inadequate glycemic control increases the incidence of constipation in people with diabetes mellitus, and further research is needed to prove this hypothesis.

Keywords: Diabetes, Constipation, Vagus nerve, Blood sugar level, Neuropathy

INTRODUCTION

Constipation refers to bowel movements that are infrequent or hard to pass. It is a common cause of painful defecation. Severe constipation includes obstipation (failure to pass stools or gas) and fecal impaction. Constipation is common in the general population incidence of constipation varies from 2 to 30% (Quan *et al.*, 2008). The definition of constipation includes the infrequent bowel movements (typically three times or fewer per week), difficulty during defecation (straining during more than 25% of bowel movements or a subjective sensation of hard stools), or the sensation of incomplete bowel evacuation. Constipation occurs when

the colon absorbs too much water or if the colon's muscle contractions are slow or sluggish, causing the stool to move through the colon too slowly. As a result, stools can become hard and dry. Common causes of constipation are not enough fiber in the diet, lack of physical activity (especially in the elderly) medications, milk, irritable bowel syndrome, changes in life or routine such as pregnancy, aging, and travel, abuse of laxatives, ignoring the urge to have a bowel movement, dehydration, specific diseases or conditions (Stuart, 2005).

Diabetes Mellitus (DM), a common ailment, is becoming one of the world's most critical public health challenges. It is estimated that 173 million individuals are affected by this condition, with 300 million expected by

2030. Diabetes mellitus is a systemic disease characterized by chronic hyperglycemia and affects metabolism of carbohydrates, proteins and fats, provoking several complications such as retinopathy, nephropathy and neuropathy. Patients with diabetes have many gastrointestinal symptoms because of hyperglycemia and neuropathy that affect GI motility (Leonard *et al.*, 2009). Autonomic neuropathy is regarded as one of the important mechanism of constipation; gastrointestinal motility disturbances including oesophageal motor dysfunction, constipation and diarrhoea are common in patients with diabetes mellitus. It may lead to an absence of postprandial gastrocolonic response, a reflex that should be present in healthy people. Recently, several recent studies showed that acute changes in the blood glucose concentration also had a major effect on the GI motility functions in healthy subjects (Jones *et al.*, 2002). Poor glycemic control has the potential to cause constipation in diabetic patients. In addition, the prevalence of constipation and the use of laxatives were reported to be higher in patients with diabetes than those without (Bytzer *et al.*, 2002).

The notion that diabetic neuropathy leads to intestinal motility problems has been proposed based on the similarities between gastrointestinal symptoms after vagotomy and sympathectomy and those reported in diabetes patients (Feldman and Schiller, 1983). Participants from all over the world met in Rome in 1999 to agree upon the Rome III Criteria, which defined constipation. The present study was conducted to determine the frequency of constipation in people with diabetes. Therefore the study is planned to investigate the prevalence of constipation in people with diabetes mellitus and non diabetics. Knowledge of epidemiology of constipation is highly relevant to primary care providers, gastroenterologist juices and health care policy makers.

METHODOLOGY

A case control study was conducted among the diabetic patients as cases and non diabetics as control group to check the prevalence rate of constipation and severity of constipation with changes in glycemic level. The locale of the study was Udham Singh Nagar district of Uttarakhand and total duration of study was 6 months. By taken into consideration the prevalence rate of diabetes is around 20-30 % in Utrakhnad. So at 5% precision and 95 % level of confidence, minimum sample must be 323. Therefore the total sample size selected

was 350. Respondents were asked to complete a questionnaire, which included basic demographic information (gender, ethnicity, age), (1) less than three bowel movements per week, (2) an attempt to empty, (3) firm or lumpy stools, (4) a sense that an evacuation is incomplete, (5) a belief that an evacuation is impeded, and (6) manual defecation procedures are all considered constipation symptoms, according to Rome III. In order to diagnose and describe constipation as per the Rome III criteria, at least two of these symptoms must be present for a minimum of six months (Mostafa, 2008). Diabetes mellitus related data, like glycated haemoglobin levels, were also analyzed to see if glycemic control had an impact on the development of constipation. We included specific exclusion criteria to decrease confounding biases: pregnant individuals, past history of gastrointestinal illnesses, Obese population with BMI above 35, digestive tract operations, and mental problems, all of which are known to impact enteric physiology. SPSS 23 was used to compute and analyze the data.

Selection of cases and control:

Random selection of population of subjects with diabetes mellitus across the age group 25-65 years and different grades of severity from general population was done from the district hospital records and selection of suitable control groups was also done. By the epidemiological survey using a pretested, structured questionnaire was used to collect information on stool type, anthropometric profile, dietary habits, defecation pattern and general information was recorded and a questionnaire had been designed including age, sex, past medical history, constipation symptoms and sign, duration and complication of diabetes mellitus. All the subjects and controls were personally interviewed. A survey was conducted using pre structured questionnaire and Rome III criteria. For estimation of blood glucose level of diabetes patients the standard instrument, glucometer was used. The association between diabetes and the proportion of subjects with and without a particular symptoms of constipation was assessed by the correlation. Results are expressed as odds ratio with 95 % confidence interval.

Table 1 : 2x2 Contingency Table , Rate Ratio (Cases)

Rate Ratio	Cases	Control	Relative risk for constipation
	0.8	0.35	2.29

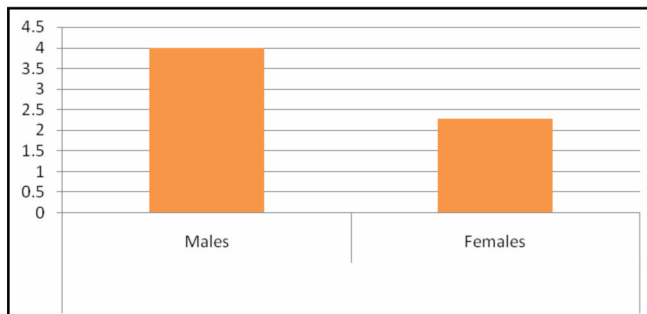
$$160/200 = 0.8$$

Rate Ratio (Control):

$$70/200 = 0.35$$

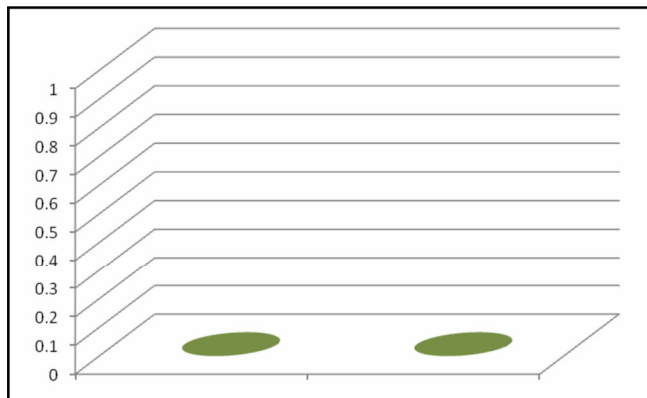
Relative Risk:

$$\frac{\text{Rate Ratio (Cases)}}{\text{Rate Ratio (Control)}} = \frac{0.80}{0.35} = 2.29$$

**Fig. 1 : Rate ratio of constipation in cases and control**

$$\text{Relative Risk (for males)} = 80/100 = \frac{4:1}{20/100}$$

$$\text{Relative Risk (for Females)} = 160/100 = \frac{2.28:1}{70/100}$$

**Fig. 2 : Relative risk of constipation in diabetic patients****RESULTS AND DISCUSSION**

In the present study, the rate ratio for occurrence of constipation in the control group was found to be 0.35 while the same for the case group was 0.80. The relative risk associated was calculated to be 2.29. Thus, it can be concluded that the people with diabetes are at a relatively higher risk of developing constipation. It can also be justified by the following statements. Diabetes mellitus is a

systematic disease characterized by chronic hyperglycemia and affects metabolism of carbohydrates, proteins and fats. Autonomic neuropathy is regarded as one of the important mechanisms of constipation; gastrointestinal motility disturbances including oesophageal motor dysfunction, constipation & diarrhoea are common in patients with diabetes mellitus. It may lead to an absence of postprandial gastrocolonic response, a reflex that should be present in healthy people. Recently, several recent studies showed that acute changes in the blood glucose concentration also had a major effect on the GI motility functions in healthy subjects. Poor glycemic control has the potential to cause constipation in diabetic patients.

The Relative risk in case of males was found to be 4:1 while the same for females was 2.28:1. The higher risk in males may be attributed to various confounding factors like, physical activity as most of them were sedentary workers and were not involved in household activities too, diet, fluid intake and use of other medications which might be interfering with the GIT motility. The relative risk associated with High Blood sugar levels were also calculated by giving codes a, b and c to <200, 200-300, >300 mg/dl. The relative risk was found to increase with increasing blood sugar levels. This may be due to the increasing complications of neuropathy with increasing blood sugar levels that lead to decreased motility of the GIT. The association between constipation and diabetes was found in 112 individuals with poor glycemic control (HbA1c > 7).

Constipation was more common among diabetic patients. Diabetes patients with glycated haemoglobin (HbA1c) levels greater than 7 had a higher risk of constipation than diabetic patients, according to our findings. The age group of 50 to 65 years old, as well as the male gender, prevailed, according to the survey's questions. In a study of 200 patients, Maxton and Whorwell (1991), observed that those with autonomic neuropathy had more constipation than those without the disease or healthy controls. Constipation was reported in 22% of diabetics with autonomic neuropathy, which was significantly greater than in diabetics without neuropathy, according to the findings of this study. There has recently been a proposal that the management of blood glucose levels can have significant effects on digestive processes including gastric emptying, myoelectric activity, and the effect of food on the colon (Folwaczny *et al.*, 1999). Several investigations have shown that during

hyperglycemia, stomach emptying is delayed in both normal people and diabetes patients. According to Koch *et al.* (2008), among individuals with type II diabetes, the threshold for delayed stomach emptying owing to hyperglycemia may be higher. Hyperglycemia increases stomach emptying for liquids and solids in healthy people and those with type I diabetes. This observation was considered as a physiological response to hypoglycemia. When healthy people were exposed to hyperglycaemic circumstances, Sims *et al.* (1994) found that their gastro colonic responses and colonic peristaltic reflex were compromised. Diabetic ketoacidosis and uremia can cause electrolyte imbalances, thereby impairing motor function. Advanced diabetes has been extensively studied in terms of its effects on gastrointestinal motor function, but the mechanism behind how symptoms develop remains obscure for many people. Some gastrointestinal diseases are frequent in people who do not have diabetes and have been linked to psychological problems. Symptoms of peripheral neuropathy were less strongly associated with mental disorders than they were with proximal digestive tract diseases or changes in bowel habits in diabetes patients in the United States. Study by Clouse and Lustman, 1989 examined 114 individuals with type I and type II diabetes, looking for signs of diabetic neuropathy or psychiatric problems as a cause for their gastrointestinal symptoms.

Conclusions:

In comparison to the general population, persons with diabetes mellitus who met the Rome III criteria had a higher rate of constipation. Inadequate glycemic control increases the incidence of constipation in people with diabetes mellitus, and further research is needed to prove this hypothesis. Despite the fact that gastrointestinal issues are widespread in diabetes patients, the pathophysiology of gastrointestinal motility has not been completely explored or understood, and further study is required to provide evidence to support this theory. Moreover, it is well understood that this is a complex condition. We found that patients with diabetes mellitus who met the Rome III criteria had a higher incidence of constipation than other patients. According to study, the likelihood of constipation in people with diabetes mellitus increases significantly when glycemic management is insufficient. In order to establish a relationship between this variable and this hypothesis and to provide evidence for this hypothesis, more studies are necessary.

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