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Original Article

Study of Autonomic Neuropathy with Special Reference to the Gall Bladder Volume in Type 2 Diabetes Mellitus

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ABSTRACT

Introduction: Diabetes is a chronic disease that occurs either when the pancreas does notproduce enough insulin or when the body cannot effectively use the insulin it produces. Diabetic neuropathy is the main cause of neuropathy in the world. There is a wide range of manifestations due to involvement of various systems such as cardiovascular, gastrointestinal, genitourinary, sudomotor and neuroendocrine systems.
Gall bladder involvement in diabetic autonomic neuropathy occurs in form of increased gall bladder volume & impaired gall bladder contraction.
Objectives: To study regarding the autonomic neuropathy with special reference to gall bladder volume in patients with type 2 diabetes mellitus.
Methodology: It is a descriptive cross sectional study conducted during February 2021 to August 2022 at VIMS Ballari. Patients fulfilling the inclusion criteria's were enrolled in the study. A pre-tested, semi-structure questionnaire was used for data collection and statistical analysis was done to obtain the results.
Results: The study included 50 patients with diabetes, with the majority being in the age group of 41-50 years. Autonomic neuropathy was observed in 36% of patients, with severe neuropathy seen in 14 patients. The duration of diabetes was found to be significantly higher in patients with autonomic neuropathy compared to those without. The mean gall bladder volume was significantly higher in diabetic patients with autonomic neuropathy compared to those without. The observed values were found to be statistically significant ($p < 0.05$). The study indicates a correlation between autonomic neuropathy and gall bladder volume in diabetic patients.
Conclusion: In the current study we have observed a significant association between diabetes and autonomic nervous system. The gall bladder volume was significantly higher among diabetics. Hence, early detection and prompt treatment can help prevent the associated complications and morbidity related to DAN.

Key Words: *Diabetic Autonomic Neuropathy, Gall Bladder Volume*

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INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas does notproduce enough insulin or when the body cannot effectively use the insulin it produces. The incidence and prevalence of diabetes mellitus (DM) is increasing all over the world, with an estimated 425 million people suffering from DM [1].

Diabetic neuropathy is the main cause of neuropathy in the world. It is anunder-recognised complication of diabetes and the prediabetic state. it plays a key role in morbidity and mortality in patients with type 1 and type 2 diabetes mellitus (T1DM and T2DM).Diabetic neuropathy is classically defined as "the presence of symptoms and/or signs of peripheral nerve dysfunction in people with diabetes after the exclusion of other causes" [2].

There is a wide range of manifestations due to involvement of various systemssuch as cardiovascular, gastrointestinal, genitourinary, sudomotor and neuroendocrine systems. Cardiac autonomic neuropathy is the most dreaded complication that carries significant risk of mortality and morbidity [3].

Increased prevalence of gall bladder disease in diabetics have been observed. Gall bladder involvement in diabetic autonomic neuropathy occurs in form of increased gall bladder volume & impaired gall bladder contraction. Gall bladder tone is mainitained by Vagal parasympathetic fibers and it also influences it's emptying [4, 5].

Therefore, gall bladder dysfunction may occur in autonomic neuropathy. Due to impaired contraction, stasis occurs and results in gall stone formation. It is necessary to routinely evaluate gall bladder function in diabetic patients [6]. Ultrasonography is the chosen diagnostic modality to assess the gall bladder volume as it is safe, accurate, lesstime consuming and inexpensive [7, 8].

Hence, this study was undertaken to determine the prevalence of gall bladder dysfunction in type 2 diabetic patients and also its association with diabetic autonomic neuropathy.

AIMS AND OBJECTIVES

To study regarding the autonomic neuropathy with special reference to gall bladder volume in patients with type 2 diabetes mellitus.

METHODOLOGY

Study design: Descriptive cross-sectional study.

Study Period: February 2021 to August 2022

Inclusion criteria:

1) Duration of diabetes >5 years.
2) Well controlled blood sugar levels.

Exclusion Criteria:

- Patients with a history of other chronic medical conditions, such as liver or kidney disease, that could affect gall bladder function or volume
- Patients with a history of gall bladder disease or previous gall bladder surgery
- Pregnant women or women who are breastfeeding, as hormonal changes during pregnancy and lactation can affect gall bladder function and volume
- Patients with a history of alcohol or drug abuse, as these substances can also affect gall bladder function and volume
- Patients who are currently taking medications that could affect gall bladder function or volume, such as certain cholesterol-lowering drugs or hormonal contraceptives.

A pre-tested, semi-structure questionnaire was used for data collection.Informationregarding socio-demographic factors, history was collected and complete physical examination was performed.

Patients were investigated for RBS, FBS, PPBS and HbA1c for good glycemic control. Ultrasonography was performed to measure the gall bladder volume in patients. Cardiac autonomic neuropathy was assessed clinically by non-invasive bedside tests: heart rate variation during squatting, deep breathing, blood pressure response tostanding and BP response to sustained hand grip.

The various factors and their association were studied using chi-square test and students' t test. P value of <0.05 was considered statistically significant.

RESULTS

Out of 50 patients, majority of them were in the age group of 41-50 years (54%).In our current study, 32 (64%) patients did not have autonomic neuropathy and 18 (36%) patients had autonomic neuropathy. Mild autonomic neuropathy was seen only in 1 patient, moderate autonomic neuropathy was seen in 3 patients and 14 patients had severe autonomic neuropathy.

In the present study, 18 DM patients had autonomic neuropathy and there was noevidence of autonomic neuropathy among 32 DM patients.

In the present study, majority (18%) of patients with autonomic neuropathy had diabetes for a duration of 5-7 years (mean duration of diabetes with autonomic neuropathy was 8.27±2.49).

Majority (32%) of patients without autonomic neuropathy were also found with DMduration of 5-7 years (mean duration of diabetes without autonomic neuropathy was 6.84±1.70). The observed values were found to be statistically significant ($p < 0.05$).

In the current study, mean gall bladder volume in diabetic patients with autonomic neuropathy was 41.11±18.86 ml and diabetic patients without autonomic neuropathy was 19.28±16.10 ml. The difference was found to be statistically significant , $p <0.05$.

The least gall bladder volume in this study was 13 ml and maximum was 70ml, meangall bladder volume was 19.99±13.24 ml. Minimum duration diabetes was 5 years and maximum was 15 years. Mean duration of diabetes was 7.40±2.08. P value is <0.05, statistically significant correlation.

DISCUSSION

In the present study, majority (18%) of patients with autonomic neuropathy had diabetes for a duration of 5-7 years (mean duration of diabetes with autonomic neuropathy was 8.27±2.49).

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The least gall bladder volume in this study was 13 ml and maximum was 70ml, mean gall bladder volume was 19.99±13.24 ml. Minimum duration diabetes was 5 years and maximum was 15 years. Mean duration of diabetes was 7.40±2.08. P value is <0.05, statistically significant correlation.

Garjesh S Rai also observed a positive correlation between gall bladder volume and duration of diabetes mellitus [9]. In our current study, 32 (64%) patients did not have autonomic neuropathy and 18 (36%) patients had autonomic neuropathy. Mild autonomic neuropathy was seen only in 1 patient, moderate autonomic neuropathy was seen in 3 patients and 14 patients had severe autonomic neuropathy.

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Reddy RH et al. [10], fasting GB volume was found significantly higher in diabeticpatients with autonomic neuropathy compared to controls. Which is similar to the study done by Sharma et al [6] who also found larger fasting GBV in autonomic neuropathy patients with diabetes but contractility of gall bladder was found normal.

CONCLUSION

Diabetic autonomic neuropathy (DAN) has a significant negative impact on the qualityof life of people with diabetes. It is one of the least recognised complications of diabetes mellitus. Gall stones and significant increase in gall bladder volume are the two forms indicating involvement of gall bladder in DAN. The simplest and cost effective way to identifiy gall bladder involvement is ultrasonography. In the current study we have observed a significant association between diabetes and autonomic nervous system. The gall bladder volume was significantly higher among diabetics. Hence, early detection and prompt treatment can help prevent the associated complications and morbidity related to DAN.

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