

A study of prevalence of cardiac autonomic neuropathy in diabetic patients

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Abstract

Introduction: Autonomic neuropathy is a common and often distressing complication of diabetes mellitus. Diabetic cardiac autonomic neuropathy (CAN), a serious complication found in one-fourth of type 1 and one-third of type 2 diabetic patients, is associated with increased morbidity and mortality. **Aims and Objectives:** To study Prevalence of Cardiac Autonomic Neuropathy in Diabetic Patients **Methodology:** This was a cross sectional study among the diabetic patients at tertiary care hospital during the period of Jan 2014 to Dec 2015 all diabetic patients suspected of Cardiac Autonomic Neuropathy with the inclusion criteria i.e. Prolonged QTc associated with any of the following condition i.e. Resting tachycardia, Orthostatic hypotension, Abnormal response to diastolic handgrip test were included into the study. As per these criteria total 66 patients were included into the study. Statistical analysis was done by Chi-Square test for trend; calculated by Graph pad Prism 6 software. **Result:** In our study we have observed that Minimum age of patient was 36 and maximum was 78 mean age was 58.5years. Prevalence of cardiac autonomic neuropathy in our study was 37 % (23/62).Prevalence of cardiac autonomic neuropathy was more in females compared to males. Total 25 patients found to have cardiac autonomic neuropathy, of the 15 were females. As the duration of DM increases, the risk of cardiac autonomic neuropathy increased and the difference is statistically significant($X^2=8.7$, d.f.=2, $P< 0.05$). The Clinical parameters used in our study for the classification of the CAN patients were Resting tachycardia 9%, Orthostatic hypotension 18%, Abnormal response to diastolic handgrip test 48%, Prolonged QTc 62% respectively. **Conclusion:** Prevalence of cardiac autonomic neuropathy was more in females compared to males and as the duration of DM increases, the risk of cardiac autonomic neuropathy increased.

Keywords: Cardiac Autonomic Neuropathy, Diabetes mellitus.

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INTRODUCTION

Autonomic neuropathy is a common and often distressing complication of diabetes mellitus. Diabetic cardiac autonomic neuropathy (CAN), a serious complication found in one-fourth of type 1 and one-third of type 2 diabetic patients, is associated with increased morbidity and mortality.¹ CAN is associated with a poor prognosis and may result in postural hypotension, exercise

intolerance, enhanced intraoperative instability, and an increased incidence of silent myocardial infarction and ischemia.² Diabetics with cardiac autonomic neuropathy are more prone for sudden cardiac death probably due to silent myocardial ischemia or infarction or due to malignant ventricular arrhythmias.³ An association between cardiac autonomic neuropathy and QT interval prolongation was demonstrated in many studies and it may predispose to sudden death in diabetes.^{4, 5} Increased QT dispersion was also suggested as a marker of diabetic autonomic neuropathy.⁶ Most of the data regarding QT interval and diabetic CAN are in type 1 diabetes with only few studies in type 2 diabetes.⁷⁻⁹ Autonomic neuropathy is the most common complication of Diabetes, which mainly affects the cardiovascular system, gastrointestinal system and urogenital system. The neuropathic disorder includes manifestations in the somatic and/or autonomic parts of the peripheral nervous system.¹⁰ Diabetic autonomic neuropathy [DAN] can involve both parasympathetic and sympathetic nervous

systems, Cardiovascular autonomic neuropathy [CAN] is the earliest form of autonomic dysfunction, which causes abnormalities in heart rate control as well as defects in central and peripheral vascular dynamics. Clinical symptoms of CAN such as resting tachycardia, exercise intolerance, orthostatic hypotension generally do not appear until long after the onset of diabetes. However, subclinical autonomic dysfunction can occur within a year of diagnosis in type II diabetes patients and within two years in type I diabetes patients Type II DM is constituting about 90% of the diabetic population in the Asians. With advancement in the age and duration of diabetes, there is a gradual tendency for the level of blood sugar to rise. It has been observed that mortality of diabetic patients with cardiac autonomic neuropathy is greater than those without it¹¹

MATERIAL AND METHODS

This was a cross sectional study among the diabetic patients at tertiary care hospital during the period of Jan 2014 to Dec 2015 all diabetic patients suspected of Cardiac Autonomic Neuropathy with the inclusion criteria i.e. Prolonged QTc associated with any of the following condition i.e. Resting tachycardia, Orthostatic hypotension, Abnormal response to diastolic handgrip test were included into the study. As per these criteria total 66 patients were included into the study. Statistical analysis was done Chi-Square test for trend calculated by Graph pad Prism 6 software.

RESULTS

Table 1: Distribution of the Patients as per the Age

	Minimum	Maximum	Average
Age	36	78	58.5

Minimum age of patient was 36 and maximum was 78 mean age was 58.5years

Table 2: Prevalence of Cardiac Autonomic Neuropathy

CAN	Non CAN	Total
25 (37.87%)	41 (62.12%)	66(100%)

Prevalence of cardiac autonomic neuropathy in our study was 37 % (23/62)

Table 3: Gender wise prevalence of Cardiac Autonomic Neuropathy

Sex	CAN(Percentage)
M	10(40%)
F	15 (60%)
Total	25 (100%)

Prevalence of cardiac autonomic neuropathy was more in females compared to males. Total 25 patients found to have cardiac autonomic neuropathy, of the 15 were females.

Table 4: Distribution of the Diabetic patients as per the duration and Cardiac Autonomic Neuropathy

Duration of D.M.	CAN	Non-CAN	Total
0-5	4 (18.75%)	14 (81.15%)	18 (100%)
5-10	6 (28.57%)	15 (71.23%)	21 (100%)
>10	15 (56.00%)	12 (44.00%)	27 (100%)
Total	25(100%)	41(100%)	66 (100%)

$\chi^2=8.7$, d.f.=2, $P < 0.05$, χ^2 for trend is Significant.

As the duration of DM increases, the risk of cardiac autonomic neuropathy increased and the difference is statistically significant.

Table 5: Clinical Parameters in Our Study

Clinical Parameters	Present Study
Resting tachycardia	9%
Orthostatic hypotension	18%
Abnormal response to diastolic handgrip test	48%
Prolonged QTc	62%

The Clinical parameters used in our study for the classification of the CAN patients were Resting tachycardia 9%, Orthostatic hypotension18%, Abnormal response to diastolic handgrip test 48%, Prolonged QTc 62% respectively.

DISCUSSION

Diabetic neuropathy is a very common chronic complication of diabetes mellitus and its incidence in many studies range from 10-90%. Prevalence of autonomic neuropathy detected using autonomic function tests varies from 40-60%.¹² Prolongation of QT interval was noticed in diabetic autonomic neuropathy by many investigators. A 1992 consensus statement on autonomic testing portrayed Bazett’s heart rate–QTcprolongation as a specific yet insensitive indicator of diabetic autonomic failure.¹³ According to a meta-analysis of 17 studies the sensitivity and specificity of QTc prolongation (>441 ms)for autonomic failure were 28% and 86%, respectively. Although QTc prolongation is relatively accurate for men, accuracy may be even greater for young men at low QTc thresholds.¹⁴In our study we have observed that Minimum age of patient was 36 and maximum was 78 mean age was 58.5years.Prevalence of cardiac autonomic neuropathy in our study was 37 % (23/62).Prevalence of cardiac autonomic neuropathy was more in females compared to males. Total 25 patients found to have cardiac autonomic neuropathy, of the 15 were females. As the duration of DM increases, the risk of cardiac autonomic neuropathy increased and the difference is statistically significant. The Clinical parameters used in our study for the classification of the CAN patients were Resting tachycardia 9%, Orthostatic hypotension18%, Abnormal response to diastolic handgrip test 48%, Prolonged QTc 62% respectively.

CONCLUSION

Prevalence of cardiac autonomic neuropathy was more in females compared to males and as the duration of DM increases, the risk of cardiac autonomic neuropathy increased.

REFERENCES

1. Vinik AI, Maser RE, Mitchell BD, Freeman R. Diabetic autonomic neuropathy. *Diabetes Care* 2003; 26:1553-79.
2. Vinik AI, Ziegler D. Diabetic cardiovascular autonomic neuropathy. *Circulation* 2007; 115:387-97.
3. Kahn JK, Sisson JC, Vinik AI. Prediction of sudden cardiac death in diabetic autonomic neuropathy. *J Nucl Med* 1988; 29:1605-6.
4. Sawicki PT, Dähne R, Bender R, Berger M. Prolonged QT interval as a predictor of mortality in diabetic nephropathy. *Diabetologia* 1996; 39:77-81.
5. Ewing DJ, Boland O, Neilson JM, Cho CG, Clarke BF. Autonomic neuropathy, QT interval lengthening, and unexpected deaths in male diabetic patients. *Diabetologia* 1991; 34:182-5.
6. Arildsen H, May O, Christiansen EH, Damsgaard EM. Increased QT dispersion in patients with insulin-dependent diabetes mellitus. *Int J Cardiol* 1999; 71:235-42.
7. Sivieri R, Veglio M, Chinaglia A, Scaglione P, Cavallo-Perin P. Prevalence of QT prolongation in a type 1 diabetic population and its association with autonomic neuropathy. The Neuropathy Study Group of the Italian Society for the Study of Diabetes. *Diabet Med* 1993; 10:920-4.
8. Veglio M, Borra M, Stevens LK, Fuller JH, Perin PC. The relation between QTc interval prolongation and diabetic complications: The EURODIAB IDDM Complications Study Group. *Diabetologia* 1999; 42:68-75.
9. Takebayashi K, Aso Y, Sugita R, Takemura Y, Inukai T. Clinical usefulness of corrected QT intervals in diabetic autonomic neuropathy in patients with type 2 diabetes. *Diabetes Metab* 2002; 28:127-32.
10. American Diabetes Association and American Academy of Neurology: Report and recommendations of the San Antonio Conference on diabetic neuropathy (Consensus Statement). *Diabetes*. 1988; 37: 1000–1004.
11. Aron I, Vinik, Raelene E, Master, Braxton, Roy, Freeman. Diabetic Autonomic neuropathy. *Diabetes Care*. 2003 May; 26:1553-79.
12. Ewing DJ, Martyn CN, Young RJ, Clarke BF. The value of cardiovascular autonomic function tests: 10 years experience in diabetes. *Diabetes Care* 1985; 8:491-8.
13. Kahn R. Proceedings of a consensus development conference on standardized measures in diabetic neuropathy. Autonomic nervous system testing. *Diabetes Care* 1992; 5:1095-103.
14. Whitsel EA, Boyko EJ, Siscovick DS. Reassessing the role of QTc in the diagnosis of autonomic failure among patients with diabetes: A meta-analysis. *Diabetes Care* 2000; 23:241-7.

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