

***Correlation between level of Haemoglobin A1C
and Cardiac Diastolic Function in Type 1 DM and
without overt Heart disease***

Thesis

Submitted for Partial Fulfillment of Master Degree of Cardiology

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دراسة العلاقة بين نسبة الهيموجلوبين السكرى
والوظائف الانبساطية للقلب فى مرضى البول السكرى
من النوع الأول والذين لا يعانون من أمراض قلبية
صریحة

توطئة للحصول على درجه الماجستير في
القلب والأوعية الدموية

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Summary

Cardiovascular complications are the leading causes of mortality in type 1 DM. The severity of this problem is clearly illustrated by the finding that type 1 DM patients suffer from mortality rates many times higher than of the general population.

Diabetes increases the risk of heart failure both in men and women, the main etiological factors contributing to heart failure in diabetes are coronary artery disease, systemic hypertension and diabetic cardiomyopathy, in the same time poor glycemic control may be associated with an increased risk of heart failure among adult patients with diabetes.

Diabetic cardiomyopathy is a clinical condition in which ventricular dysfunction occurs independently of coronary artery disease and hypertension. It clinically manifests initially as asymptomatic diastolic dysfunction and then progresses to symptomatic heart failure.

This work studied the relation between the degree of glycemic control in type 1 DM (by the assessment of level of HbA1c) and cardiac diastolic function. It included 50 subjects with type 1 DM with age ranged from 11 to 29 years and average diabetic duration of 7 years.

Cardiac function was assessed by Echocardiographic, Doppler and Tissue Doppler Imaging studies. The study showed that there is statistically significant difference between diabetic population and control group as regard Doppler A wave, E/A ratio, deceleration time and IVRT. Also there was statistically significant difference between the two groups as regard TDI of septal mitral flow with p value < .001 in septal and lateral (e') and p value < .0001 in septal and lateral E/e'.

There was a direct relationship between level of HbA1c and cardiac diastolic function with sensitivity of 92% and specificity of 75%.

The level of HbA1c was directly related to septal and lateral E/e' TDI of mitral flow and there was indirect relationship between HbA1c level and septal and lateral (e') TDI of mitral flow.

There was no significant correlation between duration of diabetes and Doppler and TDI findings in our study.

Conclusion

- More than 50% of Patients with Type 1 DM have impaired cardiac diastolic function with either conventional or TDI.
- Diastolic dysfunction in diabetic patients can be asymptomatic and can exist without systolic dysfunction.
- The Diabetic patients, who gave echocardiographic evidence of cardiac diastolic dysfunction, have poor glycemic control with HbA1c more than 7.45%.

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List of Abbreviations

<i>Abbreviation</i>	<i>Title</i>
• 2-h PG.....	2 hours post prandial Plasma Glucose.
• 2D Echocardiography	2-Dimensional Echocardiography.
• ADA.....	American Diabetes Association.
• AGEs.....	Advanced glycation end products.
• ATP.....	Adenosine triphosphate.
• AV.....	Aortic valve.
• BP.....	Blood pressure.
• CAD.....	Coronary Artery Disease.
• CHD.....	Coronary heart disease.
• CML.....	Carboxymethyl lysine.
• CMR.....	Cardiac Magnetic Resonance.
• CVD.....	Cardiovascular diseases.
• DCM.....	Diabetic cardiomyopathy.
• DD.....	Diastolic dysfunction.
• DHF.....	Diastolic heart failure.
• DM.....	Diabetes Mellitus.
• DN.....	Diabetic nephropathy.
• DR.....	Diabetic retinopathy.
• DT.....	Deceleration time.
• EASD.....	European Association for the Study of Diabetes.
• ECG.....	Electrocardiograph.
• EDD.....	End Diastolic Diameter.
• EF.....	Ejection fraction.
• ESD.....	End Systolic Diameter.
• ESRD.....	End-stage renal disease.
• Fig.....	Figure.
• FPG.....	Fasting Plasma Glucose.
• Hb A1c.....	Glycosylated Haemoglobin.
• HDL.....	High density lipoprotein.

- HF.....Heart failure.
- HTN.....Hypertension.
- IDDM.....Insulin-Dependent diabetes mellitus.
- IFG.....Impaired Fasting Glucose.
- IGT.....Impaired Glucose Tolerance.
- IHD.....Ischemic heart disease.
- IVRT.....Isovolumetric relaxation time.
- IVS.....Inter-ventricular Septum.
- LA.....Left atrium.
- LAD.....Left atrial Diameter.
- LV.....Left ventricle.
- LV DD.....Left ventricular Diastolic dysfunction.
- LVEF.....Left ventricular ejection fraction.
- MI.....Myocardial infarction.
- MV.....Mitral valve.
- NIDDM.....Non-Insulin-Dependent diabetes mellitus.
- PV.....Pulmonary vein.
- SBP.....Systolic blood pressure.
- SD.....Standard deviation.
- SR.....Sarcoplasmic reticulum.
- SV.....Stroke volume.
- T1DM.....Type 1 Diabetes Mellitus.
- T2DM.....Type2 Diabetes Mellitus.
- TDI.....Tissue Doppler Image.
- UKPDS.....UK Prospective Diabetes Study.
- WHO.....World Health Organization.