

Study Of Coronary Artery Calcification Risk In Type-1 Diabetes Mellitus (A Pilot Study)

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List of abbreviations

ACE- I:	Angiotensin Converting Enzyme-Inhibitors
ACR:	American College of Radiology
ACS:	Acute coronary syndrome
ADA:	American Diabetes Association
AER:	Albumin Excretion Rate
AGEs:	Advanced Glycation End products
AHA:	American Heart Association
AU:	Agatston Unit
BMI:	Body Mass Index
CAC:	Coronary Artery Calcification
CACP:	Coronary artery calcified plaque
CAD:	Coronary Artery Disease
CHD:	Coronary heart disease
CRP:	C-reactive protein
CSII:	Continuous Subcutaneous Insulin Infusion
CVD:	CardioVascular Disease
DCCT:	Diabetes Control and Complications Trial
DKA:	Diabetic Keto-Acidosis
DN:	Diabetic Nephropathy
EBCT:	Electron Beam CT
ECAC:	Epidemiology of Coronary Artery Calcification
EDC:	Epidemiology of Diabetes Complications
EDIC:	Epidemiology of Diabetes Interventions and Complications
FGF 1	Fibroblast Growth Factor 1
FTG:	Fasting Triglyceride
HbA1c:	Glycosylated hemoglobin

List of abbreviations(cont.)

HDL:	High Density Lipoprotein
HMG-Co A	Hydroxy-Methyl Glutaryl-Coenzyme A
HOPE:	Heart Outcomes Prevention Evaluation
HPS :	Heart Protection Study
hsCRP:	high-sensitivity C-reactive protien
HU:	Hounsfield Units
IIT:	Intraportal Islet Transplantation
IMT:	Intima Media Thickness
IPCs:	Insulin Producing Cells
IPII:	Intra Peritoneal Insulin Infusion
ISPAD:	International Society of Pediatric & Adolescent Diabetes
IVUS:	IntraVascular UltraSound
JDFI:	Juvenile Diabetes Foundation International
LDL:	Low Density Lipoprotien
LV:	Left ventricle
MBL:	Mannose Binding Lectin
MDCT:	Multi-Detector Computed Tomography
MESA:	Multi-Ethnic Study of Atherosclerosis
MI:	Myocardial Infarction
MIS:	Meal induced insulin sensitization
MMPs:	Matrix MetalloProteinases
MSCs:	Mesenchymal Stem Cells
MSCT:	Multislice Spiral Computed Tomography
NCEP:	National Cholesterol Education Program
NHLBI:	National Heart, Lung, and Blood Institute
NPR:	Non Proliferative Retinopathy
PET-CT:	Positron Emission Tomography CT
RBS:	Random blood sugar

List of abbreviations(cont.)

RSNA:	Radiological Society of North America
SPK:	Simultaneous Pancreas-Kidney Transplantation
TC:	Total Cholesterol
TG:	Triglyceride
TIMPs:	Tissue Inhibitors of Matrix Metalloproteinases
UAE:	Urinary Albumin Excretion
VEGF:	Vascular Endothelial Growth Factor
VLDL:	Very Low Density Lipoproteins

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Abstract

Study of Coronary Artery Calcification Risk in Type-1 Diabetes Mellitus (A Pilot Study)

OBJECTIVE: Type 1 diabetes is associated with a four- to eightfold excess risk of coronary heart disease. The aim of the study was to assess coronary artery calcification among patients with type 1 diabetes mellitus and to Determine its relationship with age and gender of patient, duration of diabetes mellitus, dyslipidaemia, CRP, glycaemic control and microvascular complications.

RESEARCH DESIGN AND METHODS: cross sectional study comprised 30 patients with type I Diabetes Mellitus whose ages ranged from 12 to 18 years old (mean age = 15.93 ± 1.99) and their duration of illness ranged between 10 years and 15 years (mean = 12.20 ± 1.54). They were 15 girls and 15 boys (girl: boy = 1:1). Patients were compared with 10 normal non diabetic individuals matching in age & sex as a control group. Multislice Spiral Computed Tomography (MSCT), lipid profile and C-reactive protein had been done to patients and controls. Complete medical examination and laboratory investigation were done in diabetics for evaluation and assessment of glycaemic control and presence of microvascular complications.

RESULTS: 6 (20%) out of 30 type 1 diabetics enrolled in the study were diagnosed as having positive Coronary Artery Calcification (CAC). the mean calcium score in the patient's group was 12.26 ± 41.42 AU compared to zero in the control group but the difference was not statistically significant. Gender, duration of DM and glycaemic control could not be significantly related to the evidence of plaque in coronary arteries by calcium score. On the other hand, age, weight and smoking status were important determinants for evidence of coronary artery calcification in type 1 diabetics. Mean systolic , diastolic blood pressure centile and mean random blood sugar were found to be higher in positive CAC diabetics than negative CAC diabetics with high statistical difference ($P < 0.05$). Coronary artery calcification was highly significantly related to the presence of retinopathy and nephropathy in the present study (all CAC positive diabetic patients had diabetic nephropathy and retinopathy in our study). There was statistical significant difference between type 1 diabetics and controls in terms of plasma lipid profile. Also a high positive correlation was found between the level of dyslipidaemia (level of Triglyceride, LDL and HDL) and presence of calcium in coronaries. Type 1 diabetics had high mean level of CRP compared to controls (high significant difference), but was not significant factor in relation to evidence of coronary artery calcification.

CONCLUSIONS: It was concluded that microvascular complications of type 1 diabetes mellitus might contribute to coronary heart disease risk factor supporting its role in pathogenesis of CHD in type 1 diabetics. Dyslipidaemia appears to be an important factor in occurrence of CHD in type 1 diabetes mellitus.