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Meenakshi Gupta

2018

DEDICATION

I dedicate this work to my parents and brother who have been very supportive, and believe in me despite all my challenges, and have done everything possible to keep me happy and fulfill all my wishes.

DECLARATION

I declare that this dissertation is my own work. It is being submitted for the Masters degree in Internal Medicine at the University of Zambia, Lusaka. It has not been submitted before for any degree or examination at this or any other University.

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The dissertation by Dr Meenakshi Gupta is approved as a partial fulfilment of the requirement for the award of the degree of Master of Medicine in Internal Medicine by The University of Zambia.

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ABBREVIATIONS AND ACRONYMS

ABI	Ankle Brachial Index
ABN	Abnormal
ACS	Acute Coronary Syndrome
AV/AoV	Aortic Valve
BMI	Body Mass Index
CI	Confidence Interval
CKD	Chronic Kidney Disease
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
ECG	Electrocardiography
ECHO	Echocardiography
EDV	End Diastolic Volume
EF	Ejection Fraction
IGT	Impaired Glucose Tolerance
IQR	Interquartile range
IVC	Inferior vena cava
IVSd	Intraventricular septum in diastole
IVSs	Intraventricular septum in systole
HDL	High density lipoprotein
LA	Left atrium
LDL	Low density lipoprotein
LVH	Left ventricular hypertrophy

LV	Left ventricle
LVIDd	Left ventricular internal wall diameter in diastole
LVIDs	Left ventricular internal wall diameter in systole
LVOT	Left ventricular outflow tract
LVPwd	Left ventricular posterior wall diameter
MI	Myocardial infarction
MV	Mitral Valve
MVOA	Mitral valve orifice area
NYHA	New York heart association
PAD	Peripheral artery disease
PV	Pulmonic valve
PVAT	Pulmonary valve acceleration time
RA	Right atrium
RV	Right ventricle
ScCVD	Subclinical cardiovascular disease
SD	Standard deviation
TR	Tricuspid regurgitation
TV	Tricuspid valve
UTH	University Teaching Hospital

DEFINITIONS OF TERMS

Subclinical Cardiovascular disease: defined as any abnormality identified on ECG, ECHO or ABI, that has not been documented before and the participant shows no symptoms despite the abnormality.

Diabetic cardiomyopathy: defined as structural and functional myocardial abnormalities without coronary artery disease, hypertension or valvular heart disease. It is characterized by diastolic dysfunction.

Abnormal ECG: according to the Minnesota code for interpretation of ECG abnormalities (appendix 4), an abnormal ECG was defined by the presence of the following; left ventricular hypertrophy, arrhythmias, AV conduction defects, ventricular conduction defects, QT prolongation, ST-T changes, abnormal or presence of Q waves and T wave abnormalities.

Abnormal Echocardiogram: defined by the presence of the following (based on American Society of Echocardiography and European Association of cardiovascular imaging):

- Left ventricular systolic dysfunction – ejection fraction less than 52% for males and less than 54% for females
- Left ventricular diastolic dysfunction – abnormalities in the e/a ratio, with e/a<0.8 for impaired relaxation, e/a = 0.8-1.9 for pseudonormal pattern (abnormality unmasked using the Valsalva maneuver and e/a ≥ 2 for restrictive pattern.
- Left ventricular dilatation (mid cavity diameter at end diastole) - ≥54mm for females and ≥60mm for males
- Left atrial dilatation (diameter) - ≥ 39mm in females and 40mm in males
- Presence of pericardial effusion – defined as an echo-free space of > 10mm.

Valvular abnormalities in terms of structure and function were defined using standard Doppler measurements.

HbA1c: An elevated HbA1c was any value > 7% was used for diagnosing poor glycemic control; in the absence of polycythemia, while values of ≤ 7%[38] denoted good glycemic control, in the absence of anemia and hypoglycemic episodes.

Abnormal ABI: Peripheral artery disease as defined by the presence of an abnormal ABI was divided into 2 groups. Participants with occlusive arterial disease who had an ABI of less than 0.9 and participants with calcified vessel who had an ABI of more than 1.3.[39]

Traditional CVD risk factors: Using data from the Framingham Heart Study, CVD risk factors were defined as presence of hypertension, smoking, and abnormal lipids.

ABSTRACT

Cardiovascular disease, the major cause of mortality and morbidity in modern societies, is set to overtake infectious diseases in the developing world as the most common cause of death. The increasing prevalence of major and emerging cardiovascular risk factors accounts for this growing burden. Diabetes in all its forms is one of the main cardiovascular risk factors. Two out of three diabetic patients will die because of cardiovascular complications. The association between Diabetes and Cardiovascular disease has been established in many studies. However, information is still lacking on subclinical disease as well as its associated risk factors in this population. This study aimed at establishing the prevalence of subclinical cardiovascular disease (ScCVD) among clinically stable patients with diabetes attending their regular out-patient visits. It also looked at risk factors as well as the association of ScCVD to blood glucose control. A total of 208 diabetic patients from the Outpatient Clinic 5 at the UTH (Lusaka, Zambia) were recruited based on their eligibility. Data collected included demographic characteristics, duration of diabetes, anti-diabetes drug type and cardiovascular risk factors (hypertension, BMI and smoking). Clinical data included blood pressure, BMI, Average Fasting Blood Sugar, Glycated Hemoglobin (HbA1c), Total Cholesterol and Triglycerides. ScCVD was tested using 3 tools: Ankle Brachial Index (ABI) to measure for the presence of peripheral artery disease, 12 lead Electrocardiogram (ECG) for electrical abnormalities and transthoracic Echocardiography (ECHO), to measure abnormalities in cardiac structure and function. Participants characteristics were as follows: the mean age was 54 years (SD±2.99); 160 (77%) were females; mean HbA1c was 9.6% with 75.96% of patients having raised HbA1c. 49.04% of patients were on oral hypoglycemics while 45.67% of the patients were on insulin with a small minority (5.29%) being on both oral and insulin. 61.54% of the patients were known hypertensives. The mean systolic blood pressure was 146mmHg while the mean diastolic pressure was 87mmHg. Both were above the normal blood pressure values. Mean BMI was 27 (±5.09). Use of alcohol was noted to be at 49.52%. High cholesterol was seen in 38.46% of the patients while high triglycerides was seen in only 14.9%. On ECG and ECHO abnormalities were found in 29.81% and 70.87% respectively. The commonest cardiac lesion on ECG and ECHO was T wave abnormality (17.3%) and impaired diastolic dysfunction (49%) respectively with concentric left ventricular hypertrophy being commonly found on both tools (7.2% and 35.4% respectively). Hypokinesia was noted in 5% of patients. Hypertension was found to be

the only significant confounding factor. We found level of glucose control in our patients in the Out-patient Clinic 5 was poor and prevalence of subclinical Cardiovascular diseases in self-reported healthy diabetic patients was high. We suggest all patients with diabetes presenting to the OPD at UTH do baseline and follow up ECG and Echocardiography until target glycemic control is achieved. A prospective study should be carried out to determine the true nature of ScCVD in patients with tight control of diabetes versus usual level of care.

Keywords: *Diabetes, Glycemic control, Subclinical Cardiovascular Disease*