EFFECT OF DIABETES MELLITUS ON CORONARY PLAQUE CHARACTERISTICS AND PROGRESSION BY SERIAL CARDIAC COMPUTED TOMOGRAPHY ANGIOGRAPHY (CCTA)

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BACKGROUND

Diabetes Mellitus (DM) is a major risk factor for coronary artery disease (CAD) and associated poor outcomes.

There is a higher incidence of major adverse cardiac events in patients with DM than those without DM.

Coronary plaque characteristics measured by CCTA are correlated with adverse cardiovascular (CV) outcomes.

The effect of diabetes mellitus on rates of progression of coronary plaque progression is not well understood.

Purpose: We sought to evaluate coronary plaque characteristics as well as rates of progression of coronary plaque burden as measured by serial CCTA in patients with DM and those without DM.

STUDY DESIGN & METHODS

We identified 191 participants with DM and 212 participants without DM, who were prospectively enrolled in serial CCTA trials.

Coronary Plaque volumes were measured and characterized as low attenuation plaque (LAP), total non-calcified plaque (TNCP) and total plaque (TP) using semi-automated plaque analysis software (Qangio medis).

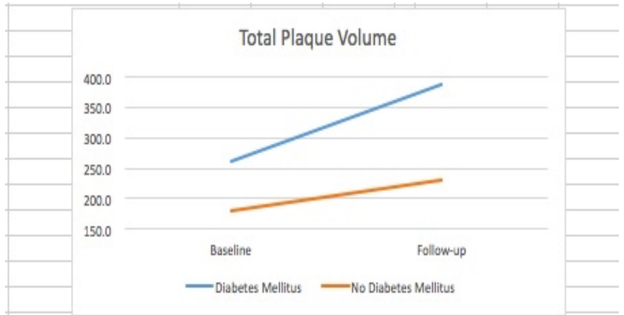
Multivariate linear regression was used to examine the effect of DM on coronary plaque progression.

TABLE 1: Baseline characteristics of the study population

	Total		DM		No DM			
	403		191		212			
	Mean /CT	Std/%	Mean /CT	Std/%	Mean /CT	Std/%	p	
Age, years	61.4	11.4	62.2	10.9	60.2	11.6	0.0221	a
Gender, Male	213	53%	85	45%	128	60%	0.0014	b
BMI	29.9	6.5	31.3	7.2	28.7	5.5	<.0001	a
Time between Scans*	18.0	30.0	15.0	19.0	24.0	40.0	0.0001	c
Diabetes	212	53%	213	112%	-	0%		b
Hyperlipdemia	252	63%	144	75%	108	51%	<.0001	b
Statin Medication	218	54%	135	71%	83	39%	<.0001	b
Hypertension	257	64%	139	73%	118	56%	0.0004	b
Past Smoking	131	33%	60	31%	71	33%	0.6567	b
CAC Score at Baseline*	164.5	698.5	206	811	158	622	0.0533	c

a: Independent T Test, b: Chi-Square test, c: Wilcoxon Rank Sum test

*Median (IQR) reported



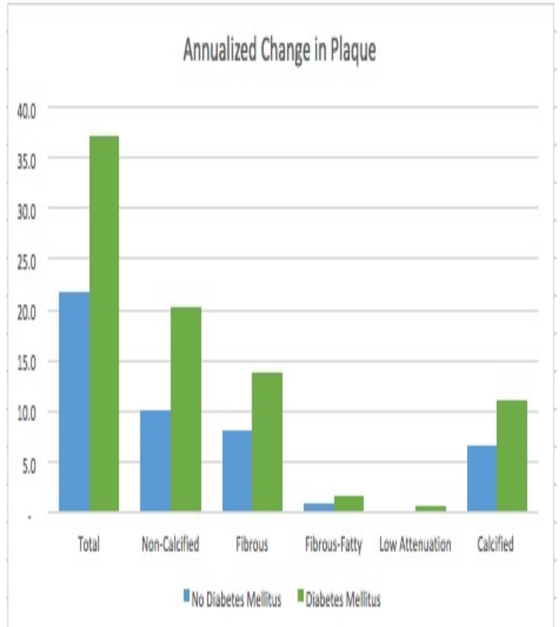


Fig 1. Rates of Progression of Normalized Coronary Plaque Volumes in Diabetics vs Non-diabetics

RESULTS

The study population included a total of 403 participants (mean age 61.4+/-11.4 years, 53% men; median scan interval 1.5 years)

Patients with DM had greater rates of progression of normalized TP volume (median change in annualized plaque (IQR): 39.1 (9.9 – 114.4) in DM vs 23.5 (4.1 – 63.8) mm3 in non-DM, p = 0.001), TNCP volume (21.6 (3.3 – 60.8) in DM vs 8.7 (0.1 – 35.6) mm3 in non-DM, p =0.003) and LAP volumes (0.7 (-0.6 – 7.8) in DM vs 0.1 (-0.4 – 1.9) mm3 in non-DM, p =0.04).

After adjusting for relevant risk factors and baseline plaque, the annualized rates of progression were higher in patients with DM by 28% for TP (p=0.004), 27% for TNCP (p=0.011), 23% for fibrous plaque (p=0.026) and by 34% for LAP (p=0.050), compared to those without DM.

CONCLUSIONS

Patients with DM have significantly higher rates of coronary plaque progression, including vulnerable LAP, than those without DM.

Our findings reveal differences in rates, burden and characteristics of coronary plaque progression in patients with DM vs those without DM.

These results provide mechanistic understanding of natural history of coronary atherosclerosis in this vulnerable population, that could explain the increased risk of CV events among patients with DM.