

# Effect of type 2 diabetes mellitus and chronic kidney disease on bone mineral density

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## Introduction

Diabetes mellitus and CKD in the elderly is associated with fragility fractures

CKD is known to be associated with lower BMD and fragility fractures

Positive association of HBA1C and BMD in T2DM is well accepted

*What is not known: Effect of combination of T2DM with CKD on BMD as compared to either alone*

## Aims

In elderly patients (>65 yrs) with fragility hip fractures

1) What is the effect of T2DM & CKD on BMD when they occur alone versus combination

2) Relationship of worsening HBA1C to BMD in T2DM alone versus T2DM + CKD

## Methods

### Study population

715 elderly patients admitted with hip fracture between Jan 2018 & Dec 2020

Exclusion criteria: Malignancy, chronic liver disease or hyperparathyroidism

Study population divided into: Gp 1 T2DM-/CKD- (n=201), Gp 2 T2DM +/CKD- (n=188) Gp 3 CKD +/T2DM- (n=166) Gp 4 CKD+/T2DM+ (N=160)

BMD using DXA at lumbar spine & femoral neck

Statistical analysis: Data analysed using ANOVA and post hoc testing with Bonferroni correction

## Results

Mean age of study population was 80.2 +/- 7.5 years

Females 69.5%

Mean BMI 25.1 +/- 3.7

## Conclusions

1. In elderly patients with hip fracture Gp 2 (T2DM +/CKD-) had a higher T-Score as compared to Gp 1 (T2DM-/CKD-)

2. There is a positive linear association between higher HBA1C and T-Score in Gp 2 (T2DM +/CKD-). This association is lost in the presence of CKD

3. The post operative length of stay (LOS) was longer in Gp 4 (CKD+/T2DM+) 10.4 days as compared to Gp 1 (T2DM-/CKD-) 8.6 days (p -0.0004)

These findings highlight importance of early detection and management of T2DM & CKD in elderly patients to improve bone health & prevent fragility fractures.

Table 1: Baseline patient characteristics by CKD and T2DM status

Variables	GROUPS				
	CKD-/DM- N=201	CKD-/DM+ N=188	CKD+/DM- N=166	CKD+/DM+ N=160	Total N=715
Females	139	125	117	116	497
Age (IQR)	78(11)	79(11)	84(9)	82(9)	80(11)
CVA	19(9.5)	14(7.4)	11(6.6)	15(9.4)	59(8.3)
Malignancy	18(9)	8(4.3)	13(7.8)	13(8.1)	52(7.3)
COPD, n(%)	6(3)	3(1.6)	4(2.4)	3(1.9)	16(2.2)
Death, n(%)	30(14.9)	34(18.1)	35(21.1)	34(21.13)	133(18.6)

Table 2: Patient variables

Variables	GROUPS				
	CKD-/DM- N=201	CKD-/DM+ N=188	CKD+/DM- N=166	CKD+/DM+ N=160	p value (ANOVA)
eGFR	60(0.17)	60(0.0)	47(20.0)	44(16.5)	<0.0001
Albumin, (g/L)	37(6.0)	37(6.0)	37(7.0)	36(5.0)	0.12
HBA1C	--	6.8(1.7)	--	6.4(1.6)	<0.0001
Calcium, (mmol/L)	2.2(0.1)	2.3(0.1)	2.3(0.2)	2.2(0.1)	0.19
Phosphate, (mmol/L)	1.1(0.3)	1.1(0.3)	1.1(0.3)	1.1(0.3)	0.06
25(OH) D	21.8(17.4)	22.3(16.6)	24.4(18.6)	21.1(17.2)	0.10
T-Score @	-3.2 (1.2)	-2.9(1.3)	-3.2(1.4)	-3(1.4)	0.03
LOS (days)*	8.6(6)	8.9(6.5)	9.7(6.5)	10.4(6.9)	0.02

Fig.1: Relationship of HBA1C to BMD in T2DM with CKD (Yes) and T2DM without CKD (No)

