# THE RELATIONSHIP BETWEEN THE SPINE DEFORMITY INDEX BIOCHEMICAL PARAMETERS OF BONE METABOLISM AND VASCULAR CALCIFICATIONS: RESULTS FROM THE EPIDEMIOLOGICAL VERTEBRAL FRACTURES ITALIAN STUDY IN DIALYSIS PATIENTS (EVERFRACT STUDY)

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## INTRODUCTION and AIMS

Vertebral Fractures (VFs) are common in the general population and in Chronic Kidney Disease patients. VFs are associated with vascular calcifications (VCs) and to an increased risk of mortality. The Spine Deformity Index (SDI) is a summary measure of the VFs status, incorporating both the number and severity of VFs in a score. The aim of this study was to evaluate the elationships between the classic SDI, laboratory parameters of bone metabolism, and vascular calcifications within the context of the EVERFRACT study.

## METHODS

In 387 hemodialysis patients, aged 64.2 ± 14.1 years, we determined routine biochemical parameters and: 25(OH)vitamin D, total Bone Gla Protein (BGP), undercarboxylated BGP (ucBGP) and total Matrix Gla Protein (MGP).
We performed laterolateral x-Rays of the spine (T5 to L4) to evaluate both VFs (defined as reduction > 20% in vertebral body height) by Quantitative Vertebral Morphometry and VCs, aortic (AoVC) and iliac (IaVC), by Witteman's method. We divided the SDI score by the number of fractures, in order to obtain a more precise index of fracture severity (corrected-SDI: c-SDI).

## RESULTS

We found a high prevalence (55.3%, n=214) of VFs. The mean SDI was 1.4 ± 1.74. The mean c-SDI was 0.74 ± 0.75. VFs had a grade of severity that was low through T5-T10 and higher through T11-L3. The severity of fractures was highlighted only by c-SDI (see Table).
We found 80.6% of AAoC and 55.6% of IAC. SDI was significantly associated with AAoC (OR=1.15, 95% CI 1.02-1.30, p=0.023).
A SDI >1 was significantly associated with: sex (male OR 1.86, 95% CI 1.20-2.91, p=0.007), age (OR 1.03, 95% 1.01-1.05, p=0.0003) and albumin ≥ 3.5 g/dL (OR 0.54, 95% CI 0.31-0.93, p=0.026). c-SDI score was significantly associated with AAoC (OR=1.48, 95% CI 1.11 - 1.98, p=0.0009) and with IAC (OR=1.54, 95% CI 1.06-2.24, p=0.025). A c-SDI >1 was significantly associated with: age (OR 1.05, 95% CI 1.03-1.07, p<0.0001), LDL Cholesterol ≥ 90 mg/dL ( OR 1.74, 95% 1.04-2.92, p=0.0354) and ucBGP ≥ 17.2 mcg/L (OR 0.35, 95% CI 0.18-0.70, p=0.0025).

*Table*

SDI and c-SDI by vertebra in all patients (*The severity of fractures was highlighted by c-SDI)

| Vertebra | Mild VF Score1 (n,%) | Moderate VF Score2 (n,%) | Severe VF Score3 (n,%) | SDI | c-SDI |
|---|---|---|---|---|---|
| T5 | 24 (6.0%) | 7 (1.7%) | 0 (0.0%) | 38 | 1.23 |
| T6 | 33 (8.3%) | 14 (3.5%) | 1 (0.2%) | 64 | 1.33 |
| T7 | 38 (9.6%) | 12 (3.0%) | 0 (0.0%) | 62 | 1.24 |
| T8 | 35 (8.8%) | 10 (2.5%) | 0 (0.0%) | 55 | 1.22 |
| T9 | 26 (6.5%) | 8 (2.0%) | 1 (0.2%) | 45 | 1.29 |
| T10 | 19 (4.7%) | 8 (2.0%) | 0 (0.0%) | 35 | 1.30 |
| .T11 | 30 (7.5%) | 14 (3.5%) | 3 (0.7%) | 67 | 1.43* |
| T12 | 35 (8.8%) | 17 (4.2%) | 2 (0.5%) | 75 | 1.39* |
| L1 | 19 (4.7%) | 12 (3.0%) | 2 (0.5%) | 49 | 1.48* |
| L2 | 4 (1.0%) | 3 (0.7%) | 2 (0.5%) | 16 | 1.78* |
| L3 | 2 (0.5%) | 3 (0.7%) | 0 (0.0%) | 8 | 1.60* |
| L4 | 13 (3.2%) | 4 (1.0%) | 0 (0.0%) | 21 | 1.24 |
| Tot | 278 | 112 | 11 | Sum 535 | Average 1.38 |

## CONCLUSIONS

SDI and c-SDI score associated with bone and vascular markers. c-SDI score performed better in the evaluation of the grade of fracture severity and it showed a stronger association with VC and vascular markers. This is the first time that the association of SDI with bone biochemical parameters and VC has been reported.

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