from relatively small sample sizes. To clarify the issues, we examined the fracture rates and BMD across a spectrum of glucose tolerance in a representative US population.
The participants of the National Health and Nutrition Survey 2005–2010 were used in this study. Among adult subjects (age≥20 years old) with reported BMI, we were able to define the states of glucose tolerance in 31,073 subjects cording to the diagnostic criteria based on HbA1c, fasting glucose, and/or 2-h post-changed glucose with established diabetes and using diabetes medications, into normal glucose tolerance (NGT), abnormal glucose tolerance (AGT), and diabetes mellitus (DM). Those who received osteoporosis medications were excluded from BMD analysis. Fracture information was available in 15,547 subjects; validated hip BMD was available in 12,317 subjects; and validated lumbar spine BMD was available in 10,329 subjects. Fracture rates were compared among 3 groups of glucose tolerance states and odds ratio (OR) with 95% confidence intervals (95% CI) were calculated in reference to the NGT group with sample weighting. BMD was compared among 3 groups of glucose tolerance with consideration of covariates.
The reported osteoporosis diagnosed rate differed among 3 groups of glucose tolerances (3.99%, 5.77%, and 8.41%, P<0.001, for NGT, AGT, and DM respectively). Worsening states of glucose tolerance were associated increased fracture OR at Hip [AGT, 2.1770 (95% CI: 2.1732–2.1807) and DM, 2.7369 (95% CI: 2.7315–2.7423)], spine [AGT, 0.9924 (95% CI: 0.9912–0.9936); DM, 1.2405 (95% CI: 1.2387–1.2423)]. In contrast, a different trend was observed on the wrist fracture rate [AGT, 0.9556 (95% CI: 0.9551–0.9562); DM, 0.9053 (95% CI: 0.9045–0.9060)]. After adjustment for covariates, higher BMD was noted in AGT and DM when compared to NGT at total femur (NGT, 0.9760±0.0015 gm/cm^2; AGT, 0.9853±0.0021 gm/cm^2; DM 0.9847±0.0034 gm/cm^2, mean±SE, P=0.001) and femoral neck (NGT, 0.8388±0.0015 gm/cm^2; AGT, 0.8474±0.0020 gm/cm^2; DM, 0.8496±0.0032 gm/cm^2, P=0.0007) while no difference was found in lumbar spine BMD (NGT, 0.1.0441±0.0018 gm/cm^2; AGT, 1.0406±0.0025 gm/cm^2; DM, 1.0464±0.0041 gm/cm^2, P=0.35).
Our observed significant increased fracture risk at hip (OR: 2.7369) and lumbar spine (OR: 1.2405) in DM subjects when compared to NGT subjects. DM subjects had higher BMD at total femur and femoral neck than NGT subjects while no difference was noted at lumbar spine BMD when compared to NGT subjects. Further studies are required to explore the discrepancy between the increased fracture risk with higher BMDs in diabetes.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

The Influence of Vitamin D Status on the Severity of SARS-CoV-2 Respiratory Infection

José Diogo Silva, MD[1], Ana Rouxinol-Dias, MD[2], Gustavo Melo Rocha, MD[1], Sara Correia, MD[1], Lúcia Almeida, MD[1], Helena Alves, MD[1], Maria João Oliveira, MD[1].
[1]Centro Hospitalar de Vila Nova de Gaia/Espinho, Porto, Portugal, [2]Center for Health Technology and Services Research, Porto, Portugal.

Introduction: The high prevalence of vitamin D (vitD) deficiency in the general population is well recognized. Evidence suggests an immunomodulatory role for vitD in pro-inflammatory conditions, but doubt remains on its association with the severity of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) respiratory infection (RI).
Aim: To assess the impact of vitD status on the severity of SARS-CoV-2 RI in adults.
Material and Methods: A cross-sectional study that included adults infected with SARS-CoV-2 until 1/14/2020 was performed. Patients taking calcium, vitD supplementation or antiepileptics, with malabsorptive and/or calcium and phosphate metabolic disorders or stage 4 or 5 chronic kidney disease were excluded. Levels of 25-hydroxyvitamin D (25(OH)D) were obtained at the time of RI diagnosis. The participants were divided into 2 groups, depending on the vitD status (sufficiency and insufficiency [≥20 ng/mL]; deficiency [<20 ng/mL]), and in 3 groups of clinical severity of RI (adapted from the update [14/10/2020] of the standard 004/2020 of the Portuguese Directorate-General for Health): mild/moderate disease (g1); severe disease without bacterial coinfection (g2); severe disease with bacterial coinfection/critical disease (g3). Other factors associated with RI severity were analyzed. A multiple logistic regression model was developed to predict the severity of SARS-CoV-2 RI, considering vitD status as a categorical variable and other variables with statistical significance after univariate analysis.
Results: This study encompassed 71 infected patients with a median age of 68 (p25;p75 = 58;77) years, 40 (56.3%) of which were women. 32 (45.1%) patients integrated g1, 14 (19.7%) g2 and 25 (35.2%) g3. 39 (54.9%) presented vitD deficiency and 32 (45.1%) vitD sufficiency or insufficiency. In the univariate analysis, vitD deficiency, age (>60 years old), male gender, Arterial Hypertension, Diabetes *Mellitus*, use of angiotensin-II receptor antagonist and reduced levels of ionized serum calcium correlated with the severity of RI. In the multivariate regression model that included these variables, vitD deficiency remained independently correlated with critical/severe disease with bacterial coinfection (g3 vs. g1: OR=9.7; CI95%=[1.7; 56.4]; p=0.011; g3 vs. g2: OR=6.3; CI95%=[1.1–37.0]; p=0.044), with a tendency, albeit not statistically significant, for severe RI without bacterial coinfection (g2 vs g1: OR=1.6; CI95%=[0.3; 7.4]; p=0.581).
Conclusions: An independent association of vitD deficiency with the severity of SARS-CoV-2 RI was found, supporting the anti-inflammatory effects of vitD. It is essential to identify and treat its deficiency in patients prone to adverse outcomes of SARS-CoV-2 RI.

Bone and Mineral Metabolism

VITAMIN D, DIABETES AND ENERGY METABOLISM

Type 2 Diabetes Clusters Indicate Diabetes Duration Key in Fracture Risk

Sam Ghatan, Msc[1], Fariba Ahmadizar, MD, PhD[1], Ruolin Li, MD[1], Carolina Medina-Gomez, Msc, PhD[1], Maria Carola Zillikens, MD, PhD[2], Fernando Rivadeneira, MD PhD[3], Maryam Kavousi, MD, PhD[1], Ling Oei, MD, PhD[4].