What Cause of Low Bone Mineral Density in HIV-Positive Patients?

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Results of a recent study found low BMD was strongly associated with body weight, smoking, and prior advanced HIV disease.

The prevalence of low bone mineral density (BMD) is high among HIV-infected patients. A previous meta-analysis showed the prevalence of osteopenia in HIV-positive individuals to be as high as 30%, corresponding to an odds ratio of 6.4 for reduced BMD as compared with uninfected individuals.1 There are also reports from randomized clinical trials showing decline in BMD within 12 months after starting combination antiretroviral therapy (cART) in treatment-naive patients.2 The cause of decreased BMD is not well understood.

A new study published in The Journal of Infectious Diseases examined the lumbar spine, total hip, and femoral neck BMD by dual-energy x-ray absorptiometry in 581 HIV-positive patients (94.7% receiving cART) and 520 HIV-negative participants from Amsterdam, 45 years older. Following, World Health Organization definitions, the study defined osteoporosis as a T-score of -2.5 SD or lower and osteopenia as a T-score between -1 and -2.5 SD.3 The study mainly comprised men who have sex with men (MSM).

The investigators designed a questionnaire to evaluate demographics, (family) medical history, use of medications, substance use, physical activity, intake of calcium/vitamin D, and risky sexual behavior. They also collected blood and urine samples for extensive laboratory tests, including several markers of inflammation (CRP), coagulation (D-dimer), microbial translocation (soluble CD14), and monocyte activation (CD163), from all study participants. Participants were also tested for hepatitis B virus and hepatitis C virus serostatus; plasma HIV-1 RNA levels were assayed in the HIV-infected participants. Data regarding HIV infection and drug use were obtained from a national registry.3

Multivariable linear regression was used to investigate independent associations between HIV, HIV disease characteristics, ART, and BMD. As expected, osteoporosis was significantly more prevalent in those with HIV infection (13.3% vs 6.7%, $P<.001$). After adjusting for body weight and smoking, however, HIV positivity was no longer independently associated with BMD. Younger MSM had overall lower body weight than older MSM and heterosexual males and females—regardless of HIV status.

In this study, lower body weight and higher smoking rate largely explained lower BMD in cART-treated HIV-positive participants. Another risk factor for lower BMD was having experienced symptomatic HIV disease (ie, a history of CDC class B or C event), which is often associated with weight loss. The low BMD observed in younger MSM remains unexplained and needs further study. The current results serve as a reminder for clinicians who treat HIV-infected patients to assess regularly for fracture risk as well as for other established risk factors.

References:
