



Bone Density and Fractures in HIV-infected Postmenopausal Women: A Systematic Review

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With the development of effective antiretroviral therapy, HIV-infected women are living longer and transitioning through menopause. The purpose of our study was to systematically examine the evidence that menopause is an additional risk predictor for osteoporosis and fractures in HIV-infected women. Electronic databases were searched for studies of low bone density or fractures in HIV-infected postmenopausal women. Studies that met the inclusion criteria (n = 10) were appraised using a validated quality assessment tool. The majority of studies were rated as good quality and the remaining were fair. The prevalence of osteoporosis reported in these studies ranged from 7.3% to 84% and 0.7% to 23% in HIV-infected and uninfected postmenopausal women, respectively. In the two qualifying studies, postmenopausal status was not a predictor of fractures in HIV-infected women. Findings suggest that HIV care providers should accurately assess postmenopausal status and modifiable risk factors for osteoporosis in all older HIV-infected women.

(Journal of the Association of Nurses in AIDS Care, 26, 387-398) Copyright © 2015 Association of Nurses in AIDS Care

Key words: bone mineral density (BMD), fractures, HIV, menopause

Access to antiretroviral therapy (ART) has increased life expectancy among HIV-infected individuals. By 2020, roughly 70% of all people living with HIV will be ages 50 years and older (Karpiak, 2014). Not only is the aging HIV population at

greater risk of developing comorbidities such as osteopenia and osteoporosis, but these conditions may also occur at a younger age (Guaraldi et al., 2011). Accelerated bone loss is a common complication of HIV infection and ART (McComsey et al., 2011). Studies have estimated an osteoporosis prevalence rate of 15% in people living with HIV (Bonjoch et al., 2010; Brown & Qaqish, 2006), and a 58% higher fracture rate compared to the general population (Shiau, Broun, Arpadi, & Yin, 2013). With the growing prevalence of HIV among people in middle and old age, there is an urgent need to better characterize the impact of HIV on osteoporosis.

From 2007 to 2010, the estimated number of adults ages 50 years or older living with HIV in the United States increased by nearly 47,000, with a growing proportion of women represented in this older group (Centers for Disease Control and Prevention, 2013). HIV-infected women face the additional consequences of estrogen withdrawal and deficiency during menopause transition, which give rise to some of the same metabolic alterations as HIV such as insulin resistance,

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elevated waist circumference, low high-density lipoprotein levels, and bone loss (Adeyemi, Rezai, Bahk, Badri, & Thomas-Gossain, 2008). Accordingly, menopause may accelerate HIV-related bone loss, and in turn, place HIV-infected postmenopausal women at greater risk for osteoporosis and associated fractures. While the National Osteoporosis Foundation (Cosman et al., 2013) added HIV to their list of conditions that cause or contribute to osteoporosis and fractures, the quality of the evidence on bone loss specifically in HIV-infected older women has not been previously examined.

Over the past several years, a number of reviews have been published on menopause-associated metabolic manifestations in HIV-infected women (Imai, Sutton, Mtodo, & Del Rio, 2013; Kojic, Wang, & Cu-Uvin, 2007; Looby, 2012). The evidence on the effect of ART on bone density in HIV-infected women has also been explored (Carvalho, Gelenske, Bandeira, & Albuquerque, 2010). However, to date, the quality of the literature on menopause-associated changes involving bone in HIV-infected women has not been systematically appraised. Therefore, to evaluate the evidence that menopause is an additional risk predictor for accelerated bone pathology in HIV-infected women, we carried out a systematic review of the current literature.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement was used as a guideline (Moher, Liberati, Tetzlaff, & Altman, 2009). The PRISMA Statement consists of a 27-item checklist to ensure a standard method of transparent reporting of systematic reviews and meta-analyses.

Search Strategy

The following electronic databases were thoroughly searched for all studies published through September 2014 on low bone density or fractures in HIV-infected postmenopausal women: Medline, Scopus, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL). A combination of the search terms “HIV infections,” “osteoporosis,”

“bone density,” and “fractures” were used. The search was limited to English-language peer-reviewed articles, and studies with postmenopausal women. A detailed outline of the search is provided in Table 1. Reference lists of retrieved articles were reviewed to identify additional relevant studies.

Eligibility Criteria

The titles and abstracts of all studies retrieved in the literature search were reviewed. No time limit was imposed and the last search was performed on September 17, 2014. Studies were eligible for analysis if they included a sample of HIV-infected postmenopausal women, and reported bone mineral density (BMD) or fracture data for HIV-infected postmenopausal women. Studies were included regardless of how postmenopausal was defined (e.g., amenorrhea for ≥ 12 consecutive months without confirmational hormone measures). Study selection was limited to BMD data obtained using dual-energy X-ray absorptiometry (DXA). DXA is a validated measure of BMD and meets the requirements of the World Health Organization diagnostic classification of osteopenia and osteoporosis (World Health Organization, 2004). Studies were excluded if they did not report any BMD or fracture data specifically for HIV-infected postmenopausal women.

Table 1. Databases and Search Terms Used in the Search Strategy

Database	Years	Search Terms
Medline	Up to September 2014	Exp “HIV infections” (MeSH Terms) AND exp “Bone density” (MeSH Terms) OR exp “Fractures, Bone” (MeSH Terms) OR exp “Osteoporosis, Postmenopausal” (MeSH Terms)
Scopus	Up to September 2014	Bone density OR Osteoporosis OR Fractures AND HIV infections
CINAHL	Up to September 2014	Bone density (MW) OR Osteoporosis (MW) OR Fractures (MW) AND HIV infections (MW)

Note. Exp = exploded; MeSH = Medical Subject Heading; CINAHL = Cumulative Index to Nursing and Allied Health Literature; MW = Word in Subject Heading.

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