



Optimising Bone Health in People Living with HIV: A Holistic Approach to Prevention and Management

Ji Soo Choi¹ and Dushyant Mital^{2*}

¹Department of Infectious Diseases, University of Leicester, Leicester, UK

²Department of Blood Borne Viruses, Milton Keynes University Hospital, Milton Keynes, UK

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Introduction

As advancements in antiretroviral therapy (ART) have transformed HIV into a manageable chronic condition, the long-term health of people living with HIV (PLWHIV) has become a critical focus. One vital aspect of this is bone health, which is frequently compromised in this population. Studies indicate that bone fractures tend to occur approximately 10 years earlier in PLWHIV compared to HIV-negative individuals, highlighting the accelerated impact of bone demineralisation in this group [1]. Therefore, a comprehensive care plan is imperative for PLWHIV to prevent and mitigate the risk of bone-related diseases.

Investigations to Assess Bone Health in PLWHIV

Bone Mineral Density (BMD) Testing

Dual-energy X-ray absorptiometry (DEXA) scans represent the gold standard for measuring BMD and diagnosing osteoporosis. This method provides precise measurements of bone density at critical sites such as the lumbar spine and hip, which are particularly prone to fractures. HIV patients has marginally lower BMD at the lumbar spine compared to general population, emphasising the need for regular DEXA scans to monitor bone health and intervene prompt [2]. This early identification of bone loss is vital, as it allows for timely initiation of treatments that can prevent progression to osteoporosis and reduce fracture risk.

Fracture Risk Assessment Tool (FRAX)

The Fracture Risk Assessment Tool (FRAX) is a valuable adjunct to DEXA scans, integrating clinical risk factors with BMD results to evaluate an individual's fracture risk. The significance of FRAX in managing bone health in PLWHIV lies in its ability to identify those at high risk for fractures who may not yet show significant bone density loss on DEXA scans. Without universal screening, a substantial proportion of HIV patients with low BMD would not have been identified, highlighting the critical role of FRAX in comprehensive HIV care [3]. By providing a more holistic assessment, FRAX enables healthcare providers to implement preventive measures earlier, potentially avoiding severe bone complications.

Biochemical Markers

The evaluation of biochemical markers such as serum calcium, vitamin D, and parathyroid hormone (PTH) levels offers additional insights into bone metabolism and turnover. These markers are instrumental in identifying deficiencies or imbalances that could exacerbate bone loss in PLWHIV as these patients have higher bone resorption markers, which are associated with reduced BMD [4]. Therefore, regular assessment of these markers can guide nutritional and pharmacological interventions to correct imbalances and support bone health.

Management of BMD in PLWHIV

The management of bone health in PLWHIV is a multidisciplinary approach that demands a holistic approach, incorporating various interventions to mitigate the risks associated with osteoporosis and fractures. Given the unique challenges faced by this population, it is imperative to adopt a comprehensive strategy that integrates advanced diagnostic tools, evidence-based treatments, and lifestyle modifications.

Antiretroviral Therapy (ART) Optimization

The optimization of ART is a critical component in managing bone health for PLWHIV. Certain ART regimens, particularly those containing tenofovir disoproxil fumarate (TDF), have been linked to increased bone loss. Switching to alternative ART regimens such as tenofovir alafenamide (TAF) can significantly reduce this risk. This highlights need for careful selection and adjustment of ART to preserve bone health [5].

Calcium and Vitamin D Supplementation

Ensuring adequate intake of calcium and vitamin D is crucial for maintaining bone health. Supplementation is essential to prevent deficiencies that can exacerbate bone loss. A study by Grijsen et al. found that vitamin D supplementation could mitigate the negative effects of HIV on bone health, as low vitamin D levels are prevalent among PLWHIV and are associated with increased bone turnover. This finding highlights the importance of addressing nutritional deficiencies as a cornerstone of bone health management in this

Contact Dushyant Mital, Department of Blood Borne Viruses, Milton Keynes University Hospital, Milton Keynes, UK.

population [6].

Bisphosphonates

Bisphosphonates are the first line of treatment for osteoporosis in PLWHIV. Long-term studies have shown that bisphosphonates can effectively stabilise or increase BMD in HIV-positive patients, leading to a reduced incidence of fractures. HIV-positive patients on protease inhibitors have a higher prevalence of reduced BMD, and thus, bisphosphonates could be particularly beneficial for those on such ART regimens. Moreover, bisphosphonates are generally well-tolerated, with most patients experiencing minimal side effects. This favourable safety profile, combined with their efficacy, makes them an essential tool in the management of osteoporosis in PLWHIV. Regular monitoring of BMD and appropriate adjustments in therapy, including the use of bisphosphonates, can help manage and even reverse bone loss in this vulnerable population.

Lifestyle Modifications

Encouraging weight-bearing exercises, smoking cessation, and reducing alcohol consumption are fundamental strategies. Brown et al. (2004) emphasised that physical activity and healthy lifestyle choices play a significant role in mitigating bone loss and improving overall bone health in PLWHIV. Activities such as walking, jogging, resistance training, and yoga help stimulate bone formation and slow down bone loss. For PLWHIV, incorporating these exercises into their regular routine can counteract the bone-depleting effects of HIV and ART. By promoting bone growth and strengthening muscle support around the bones, weight-bearing exercises not only reduce the risk of fractures but also enhance mobility and physical independence. Furthermore, nicotine and other chemicals in cigarettes impair bone remodelling by inhibiting the activity of osteoblasts and reducing calcium absorption, which is essential for bone health [7]. These lifestyle changes not only enhance bone health but also improve the overall quality of life, making them an essential component of comprehensive care.

Monitoring and Follow-Up

Regular monitoring of BMD and reassessment of fracture risk are necessary to adjust treatment plans as needed. Annual DEXA scans and periodic evaluations using the Fracture Risk Assessment Tool (FRAX) are recommended. Paton et al. demonstrated the importance of longitudinal monitoring to detect changes in BMD over time and to manage interventions effectively. Consistent follow-up ensures timely adjustments to therapy and preventive measures, thereby preventing severe complications associated with osteoporosis.

Conclusion

In conclusion, the management of bone health in people living with HIV (PLWHIV) necessitates a comprehensive and multidisciplinary approach. Given the elevated risks of osteopenia, osteoporosis, and fractures in this population, regular monitoring through tools like DEXA scans and the FRAX assessment is crucial. Effective management should include optimisation of antiretroviral therapy (ART), particularly by considering alternatives to tenofovir disoproxil fumarate (TDF) to minimise bone density loss. Additionally, addressing nutritional deficiencies through calcium and vitamin D supplementation, and the use of bisphosphonates where appropriate, are essential components of care. Lifestyle modifications, including weight-bearing exercises, smoking cessation, and alcohol reduction, further support bone health and enhance overall quality of life. By integrating these strategies into the routine care of PLWHIV, healthcare providers can significantly mitigate the risk of bone-related complications, ensuring better long-term outcomes and improved quality of life for these patients.

Declaration

No conflicts of interest declared

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