

Commentary

Should bone mineral content be part of the equation for assessing fracture risk in patients with Cerebral Palsy

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Bone health is a common concern in patients with Cerebral Palsy (CP), who have increased prevalence of fractures due to combination of reduced mobility, ataxia, cognitive impairment, medication and nutritional factors with the effects already seen in the childhood years. To put things into perspective, the prevalence of osteoporosis was reported as 4.8% in adults without CP, 8.4% in adults with CP insured privately and 14.3% in adults with CP with public insurance in the US (1). Even after adjusting for cardiometabolic diseases and osteoporosis, the higher odds of fractures in patients with CP persist (2). So far, bone mineral density (BMD) has been the main well-established way to assess fragility of the bone and risk of fractures.

However, Whitney et al. (2021) argued that this widely used measurement method alone may not be adequate based on findings from their retrospective study involving analysis of the association of bone traits - BMD, bone mineral content (BMC) and area - with history of fractures in adults with CP. The authors described findings of the same or higher BMD in adults with CP who had a history of a fracture compared to those who did not. They indicated likely underestimation of the risk of fractures in patients with CP when assessed using BMD as the reasoning behind need of other measures in addition to BMD. Another study by Duran et al. (2017) came to a conclusion opposite to what Whitney et al. (2021) showed in their paper – they found that BMD could potentially overestimate the fracture risk. However, as the patient group in their study was paediatric (4), bone development issues seen in puberty could account for the different bone trait integration.

The research on bone traits in adults with CP is very limited compared to the evidence produced on the paediatric population with CP, making Whitney et al. an important contribution to the current knowledge. BMC has previously been shown to be a more accurate measurement of bone accrual in children with CP compared to areal BMD. It has been suggested to be due to the smaller skeletal size of children with CP. Smaller bone size in CP can persist into adulthood, highlighting that BMC could also be a better indicator of bone health after puberty (5).

The use of several bone traits in fracture risk assessment in practice could have potential in selecting which patients get preventative treatment, which have to be seen for follow-up appointments and could guide non-pharmacological management, such as dietary

recommendations. Whitney et al. identified bone area as the measurement with the strongest association with history of a fracture. A potential change in currently used risk assessment does not require any extra time or resources involved, as all the traits mentioned are obtained via dual-energy X-ray absorptiometry (DXA) scan.

There are some limitations of the study by Whitney et al., the main one being low diversity of the patient sample. As vitamin D has an important role in bone mineralization, this study should be repeated in populations at different latitudes to account for varying sun exposure and dietary factors. Furthermore, given the retrospective nature of the study, results should be cautiously interpreted and further confirmatory work in prospective cohorts is desirable.

In the interim, we recommend incorporating other factors such as muscle mass into fracture risk assessment, especially in patient populations with specific mobility issues such as those with CP. Combined bone traits could also be included in a prediction score such as FRAX tool, which could incorporate factors such as sex, age, bisphosphonates therapy, anti-epileptic medication and severity of condition in patients with CP.

References

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