Falls, Fractures, and Mortality: The Role of Calcium and Vitamin D Replacement in Rural India

Osteoporosis continues to be under-recognized and under-treated in most parts of India. At present, approximately 10% of the Indian population (>100 million) is aged above 50 years[1] and with increasing longevity, osteoporosis is expected to pose a major burden in this aging population. Fragility fractures that might ensue as a result of untreated osteoporosis will result in high costs to the society. Risk factors such as vitamin D deficiency, poor dietary calcium intake, and attainment of suboptimal peak bone mass contribute to adverse skeletal health in our country.[2,3] Although a tropical country, the high prevalence of vitamin D deficiency in India is a significant health concern. As far as the Indian skin tone is concerned, the minimum duration of sun exposure required for optimal vitamin D photobiosynthesis is more than 45 min to bare face, arms, and legs to the solar UV rays (wavelength 290–310 nm). Most Indians do not get adequately exposed to sunlight to produce sufficient amounts of vitamin D endogenously. Besides, social and religious norms dictate that most parts of an individual's body, irrespective of gender be covered. Thus, endogenous production of adequate vitamin D from regular and sustained sunlight exposure may not be a feasible solution for our country.[4]

Moreover, in a study by Harinarayan *et al.*,[5] dietary calcium intake was noted to be significantly lower among the rural population when compared to individuals residing in urban areas. Most of them did not receive any calcium supplements. The problem of osteoporosis is further compounded by the lack of awareness among both physicians and patients about this condition. The availability of dual-energy X-ray absorptiometry (DXA) scanners, which is the gold standard in diagnosing osteoporosis is grossly inadequate especially in rural India, which is home to a majority of postmenopausal women in our country.[6,7] In addition, risk assessment tools like FRAX (fracture risk assessment tool) are not used for decision-making in bone care in our country.[8]

The prevalence of osteoporosis among rural postmenopausal women is approximately 40%–50% and among rural men this is approximately 20%.[9,10] In Rohtak district in Haryana, Dhanwal *et al.*[11] reported a crude incidence rate of hip fractures of 105 and 159 per 100,000 population among men and women, respectively. There are no data on incident fragility fractures of the hip from rural India, although a recent study from southern India, revealed that moderate to severe vertebral fractures was prevalent in approximately one-third of postmenopausal women.[8] There is a pressing need to pre-emptively screen the at-risk population for prevalent osteoporosis and initiate timely treatment. Ensuring optimal calcium and vitamin D supplementation in our country may play a vital role in enhancing bone health in subjects who are at risk for osteoporosis and fragility fractures. There is no single therapeutic measure that may suit all individuals as there are wide differences among our populace with regard to dietary habits and cultural practices. This will definitely warrant a multi-pronged strategy to address these issues and improve skeletal health.[1]

In this issue of *IJEM*, Seshadri *et al.*[12] studied the impact of calcium carbonate (500 mg of elemental calcium) and cholecalciferol (average daily dose of 2000 IU) on incident fractures, mortality, falls and quality of life (QoL) among rural women (>50 years) and men (>55 years) who were not requiring bisphosphonates and with a mean follow-up duration of 5 years. There were fewer incident fractures and lower mortality among subjects who were regularly taking both these supplements. There was no difference noted in falls and QoL between these groups. This is the first prospective study from India in rural population evaluating the benefit of calcium and vitamin D supplementation.

This study provides vital information about the beneficial effect of calcium and vitamin-D supplementation in reducing the risk of fragility fractures. However, there is no information provided about both prevalent and incident vertebral fractures and this has been acknowledged by the authors in this study.[12] There is conflicting evidence regarding the beneficial effects of calcium and vitamin D supplementation in postmenopausal women and elderly men as there exists significant heterogeneity between studies with regard to ethnicity, dosing schedule, and mode of administration of vitamin D. In a recent meta-analysis by Yao *et al.*,[13] standard doses of vitamin D supplementation were not associated with a reduction in fractures. In another study by Avenell *et al.*,[14] the authors concluded that vitamin D along with calcium may prevent fragility fractures. With regard to mortality, whereas some studies have documented no benefit, others have shown a beneficial impact of vitamin D supplementation.[15,16]

This study definitely throws light on the benefit of simple measures such as calcium and vitamin D supplementation in halting incident fractures in the elderly population.[12] As mentioned earlier, the rural Indian population consumes less calcium and a significant proportion of them do have vitamin D deficiency. Despite the greater proportion of milk production in rural India as compared to urban regions, rural-dwelling individuals consume less milk and milk products.[17] Therefore, it is prudent that regular supplementation of calcium and vitamin D be done in addition to encouraging more

consumption of calcium from dietary sources. Long-term measures like food fortification may be a definite solution to combat the endemicity of vitamin D deficiency.[18]

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