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Development and Evaluation of a Calcium Rich Plant-Based Supplement on Bone Turnover of Peri and Post Menopausal Women

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Abstract : Problem statement: Nutritional deficiency, especially calcium, may lead to poor bone formation and mineralization. Although there are plenty of synthetic supplements available, it is essential to make a calcium rich food supplement accessible to combat calcium deficiency that could be readily prepared at the household level. Thus the current study aimed to formulate and standardize an indigenous low-cost calcium-rich food supplement and to study the impact of supplementation on the bone resorption and formation markers. Methods: A Randomized controlled trial was conducted with 60 subjects distributed equally in control and experimental groups, including perimenopausal and postmenopausal women. A plant-based calcium-rich product was developed and supplemented in form of balls as a midmorning and evening snack by addition of optimized proportions of leaves of Sesbania Grandiflora, seeds of Sesamum indicum, Eleusine coracana, Glycine max, Vigna mungo for a period of 6 months. Postmenopausal and perimenopausal women received 1200mg and 800mg of calcium per day from the supplemented, respectively. Outcome measures like serum calcium; betacrosslaps (bone resorption marker) and total P1NP (bone absorption marker) were assessed after 3 months and after 6 months. Results: There were no significant changes seen in the serum calcium and total P1NP levels (bone formation marker) among the subjects during the supplementation period. The bone resorption marker (betacrosslaps) reduced in all the groups and the reduction (0.32 ± 0.130 ng/ml to 0.25 ± 0.130 ng/ml) was found to be statistically highly significant ($p < 0.01$) in experimental group of perimenopausal subjects and significant ($p < 0.05$) in experimental group of postmenopausal subjects (1.11 ± 0.290 ng/ml to 0.42 ± 0.263 ng/ml). Conclusion: With the current severe calcium deficiency in the Indian population, integrating low-cost, calcium-rich native foods that could be readily prepared at household level would be useful in raising the nutritional consumption of calcium, which would, in turn, decrease bone turnover.

Keywords : calcium, sesbania grandiflora, sesamum indicum, eleusine coracana, glycine max, vigna mungo, postmenopause, perimenopause, bone resorption, bone absorption, betacrosslaps, total P1NP
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