ORIGINAL ARTICLE

Knowledge of Calcium and Vitamin D Intake on Risk of Fracture among General Physicians and General Population

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Abstract

Background: *Older men and women are recommended to take at least 1000-1200 mg/day of calcium to prevent fractures, and many people take calcium and vitamin D supplements to meet these recommendations. The present study was done to evaluate the knowledge of calcium and vitamin D intake on risk of fracture among the general physicians and general population.* ***Materials and methods:*** *The study was included of group I of 68 general medical practitioners included of MBBS, BAMS, BHMS and other medical practitioners and the group II consisted of general patients came to the OPD of the hospitals. Specially formulated questions were given to each of the participants and their responses were collected and analyzed using IBM SPSS statistics version 20 with the help of student's t test.* ***Results:*** *On comparison of the scores of the general physicians and general patients, it was found that the general practitioners were having more knowledge as compared to the group II and the difference was found to be statistically highly significant.* ***Conclusion:*** *Although the general medical practitioners were having good knowledge of the calcium and vitamin D supplements, their knowledge should be continuously updated as most of them were unaware of the facts added recently to the literature.*

Keywords*: Calcium supplement, Vitamin D supplement, Fracture resistance*

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Introduction

Calcium supplementation has long been recommended for the prevention of falls and associated non-vertebral fractures. Recent studies suggest, however, that vitamin D could also play a more important role in the prevention of falls and fractures than was previously assumed. On the one hand, vitamins D maintain calcium homeostasis and thus bone mineral density, and thereby contribute to preventing fractures. On the other hand, vitamin D also seems to have a positive effect on the muscular strength in the legs, which in turn can reduce the risk of falls.[1]

Adequate calcium intake is essential for normal growth and development of the skeleton and teeth and for adequate bone mineralization. Optimizing bone mass accretion in youth and adolescence is critical to attaining peak bone mass in adulthood. In adulthood, low calcium intake has been associated with increased risk for osteoporosis, bone fractures, and falls. Vitamin D works to aid calcium absorption and its role in bone health has been well characterized.[1-5]

Older men and women are recommended to take at least 1000-1200 mg/day of calcium for bone health and prevention of fractures. The average intake in the diet in Western countries is 700-900 mg/day, and lower in Asia and Africa, meaning that older people would need to take calcium supplements to meet these recommendations. These guidelines for calcium intake have been widely implemented, and, in some Western countries, more than 30-50% of older women take calcium supplements. Clinical trials of calcium supplements at doses of 1000 mg/day, however, have reported adverse effects, including cardiovascular events, kidney stones, and hospital admissions for acute gastrointestinal symptoms. Consequently, older people have been encouraged to improve bone health by increasing their calcium intake

through food rather than by taking supplements. This advice assumes that increasing dietary calcium intake to the recommended level of >1200 mg/day prevents fractures without causing the adverse effects of calcium supplements.[6]

The present study was planned to evaluate these important aspects of the knowledge of calcium and vitamin D supplement among the general physicians and general population.

Materials and Methods

The study was included of 68 general physicians (Group I) and 162 general patients (Group II) came to the OPD of the hospital. The general physicians were of the rural area practitioners inclusive of MBBS, BAMS, BHMS or other general practitioners and not included any specialty practitioner. The study was done with the help of specially prepared questionnaires consisting of 20 questions which were validated by doing pilot study. Approval of the ethical committee was taken before start of the study and well-informed consent was taken from all the participants. The questionnaires were consisting of questions knowledge regarding the calcium supplementation, their dosage, effect on bone metabolism, bone density, vitamin D supplementation, their dosage, effect on bone metabolism, fracture resistance, their experience, effect on risk of fracture, etc.

All the questions were in the form of yes or no type responses and each correct answer was given score 1, while incorrect answer were given score zero. All the responses were collected and statistical analysis was done with the help of IBM SPSS version 20 using student's t test.

Results

Table 1: Table showing comparison of the knowledge scores of the general physicians and general patients.

Group	Participants (n)	Knowledge scores (Mean±SD)	T value	P value
I	68	15.00± 1.63	6.034	P<0.001*
II	162	10.80± 1.48		

*p<0.001= statistically highly significant

All the participants' responses were given their responses, which were collected and analyzed. On comparison of the scores of the general physicians and general patients, it was found that the general practitioners were having more knowledge as compared to the group II and the difference was found to be statistically highly significant (Student's t test, P<0.001) table 1.

Discussion

Calcium supplementation or the consumption of calcium-rich foods such as milk is commonly recommended for the prevention of osteoporosis and fractures. These recommendations are primarily based on evidence from randomized controlled trials (RCTs) with bone density as the outcome.[7]

In the elderly, a negative calcium balance is common.[8] Fractures resulting from falls among over-sixty year- olds are unfortunately common. [10] Osteoporotic fractures are frequent in elderly populations, especially in women, and are associated with high healthcare costs and individual suffering. It is problematic to make recommendations regarding calcium intake based on the results from clinical trials and previous cohort studies. To improve precision, prospective studies with repeated dietary surveys and large numbers of participants are needed.[11]

Calcium carbonate or calcium citrate supplements can reduce phosphate absorption, which may be detrimental, because a balanced ratio of calcium to phosphate is needed for bone mineralization. Each increase in calcium intake by 500 mg/d decreases phosphorus absorption by 166 mg, so a calcium supplement of 1000 mg may shift an elderly person with a relatively low phosphorus intake into phosphate deficiency. This change could augment bone resorption and thus increase fracture risk. Conversely, in the trial by Chapuy et al, the beneficial effect of vitamin D plus calcium on hip fracture risk in frail elderly women may have been enhanced by the use of tricalcium phosphate, which may have avoided a calcium-related phosphate deficiency. Furthermore, vitamin D stimulates phosphate absorption, which may enhance phosphate uptake from nutritional sources in calcium supplement users. Such a benefit is supported by a recent meta-analyses showing

that hip fracture risk is significantly reduced in trials that combined any calcium supplement with vitamin D.[7]

The high calcium intake can reduce the enlargement of the appendicular bones that generally occurs with ageing as a mechanical compensation for a decline in bone mineral density. Furthermore, high calcium doses slow bone turnover and also reduce the number of active bone remodelling sites. This situation can lead to a delay of bone repair caused by fatigue, and thus increase the risk of fractures independent of bone mineral density.[11]

It was also found that no evidence of a protective effect of vitamin D. A combination of vitamin D and calcium supplements has been shown to reduce the rate of fractures in nursing home residents. However, the role of vitamin D supplements alone remains controversial.

Ooms et al. have shown that a small dose of vitamin D increases bone mass and, although unproven at present, vitamin D might also improve muscle strength and reduce falls. In a randomized trial of people living in the community in the Netherlands, Lips et al. found no effect of daily use of 400 International Units of vitamin D on the risk of hip fracture.[12]

Vitamin D deficiency is associated with fractures in several epidemiological studies. This association could be coincidental, as older persons get frail, and frail older persons are at high risk of fracture and vitamin deficiency because they are less active and do not come outside in the sunshine.[8]

The burden of bone fractures in the community comes from the larger segment of the population without osteoporosis as well as the elderly. Drug therapy cannot be given to all persons because anti-fracture efficacy and safety remain unconfirmed in these groups and treatment costs are prohibitive. Therefore, alternative approaches such as lifestyle changes are needed to lower fracture risk in the population as a whole. Although these interventions must be efficacious, they must also have a very high level of safety because public health measures exposing many individuals at low fracture risk to rare adverse events may produce no net health benefit, as demonstrated by the study results of estrogen-progestin in the Women's Health Initiative. In addition, interventions must be practical (e.g., readily accessible to all, easily administered, have a high rate of compliance, and be inexpensive). Calcium supplementation may meet this requirements.[13]

The hypothesis that calcium deficiency causes bone fragility is plausible. Because 99% of calcium resides in bone, obligatory losses from the gut, kidney, and skin of 150 to 200 mg/d must be compensated for by increased fractional calcium absorption. If fractional calcium absorption is 25%, an intake of at least 800 mg/d is required to offset these losses. Below this level, bone must be resorbed to maintain serum calcium. On the basis of this rationale, a "deficiency" state is said to exist with intakes of less than approximately 800 mg daily. The requirement will be higher if fractional calcium absorption is lower and obligatory losses are greater, but it may be less if fractional calcium intake can be adaptively increased to 70 to 90% during low calcium intakes. In this case, calcium deficiency would not exist with intakes of more than 150 to 200 mg daily.[13,14]

The overall effect of vitamin D supplementation on fracture risk depends on the combination with calcium, the dose of vitamin D and the compliance with the supplements, and the targeted part of the population, defined by age, residence, vitamin D status and calcium intake at baseline. In general, a vitamin D supplement of 800 IU per day in combination with calcium may reduce the incidence of non-vertebral fractures by about 10–20% in an old, vitamin D-deficient population. There is a need for well-powered randomized double-blind placebo-controlled trials examining the effects of different doses of vitamin D with and without calcium on the incidence of osteoporotic fractures, eventually combined with other outcomes. Such trials should be done in different age groups including the oldest old and in populations with different vitamin D status and calcium intake at baseline.[8]

Conclusion

Although the general medical practitioners were having good knowledge of the calcium and vitamin D supplements, their knowledge should be continuously updated as most of them were unaware of the facts added recently to the literature. For this various education programs or monthly meetings of the medical practitioners

or any other source for the transfer of the knowledge should be planned.

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