

To select postmenopausal women at risk for osteoporosis who were not taking recommended amount of calcium and vitamin D supplementation

MADHU KAGAT*¹ AND RAKA SRIVASTAVA²

¹Research Schoalar and ²Assistant Professor
Department of Home Science,
Jai Narain Vyas University, Jodhpur (Rajasthan) India

ABSTRACT

During present investigation Three hundred postmenopausal women (45-55yr) residing in Jodhpur city belonging to MIG and HIG were selected on the basis of convenient sampling. The intake of Energy, Protein and Calcium was very poor in the postmenopausal subjects as compared with the suggested values given by ICMR (2010) in all the three categories (vegetarian, ova-vegetarian and non-vegetarian). Results of food frequency questionnaire clearly depicts that the intake of calcium rich foods was present but was not in sufficient quantity to meet the requirement of the postmenopausal women. Subjects under study was not found to be satisfactory and indicates the need for nutritional education of the subjects.

Key Words : Calcium, Vitamin D, Osteoporosis

INTRODUCTION

Calcium is a major component used for the mineralization of bones and teeth. Approximately 99% of the calcium exists in the bones and teeth. The skeleton is not simply a store of calcium and other minerals, it is also a dynamic tissue that returns calcium and other minerals to the extracellular fluids and blood on demand. Calcium is absorbed by all parts of the small intestine, but the most rapid absorption after a meal occurs in the duodenum, where an acidic medium (pH <7) prevails.

Vitamin D is known as the sunshine vitamin because modest exposure to sunlight is usually sufficient for most people to produce their own Vitamin D using ultraviolet light and cholesterol in the skin. Low vitamin D intake or inadequate exposure to sunlight reduces calcium absorption, especially among older adults (Gloth *et al.*, 1995). In addition, the efficiency of skin production of vitamin D by older adults is considerably lower than that of younger people. Bones itself undergoes continuous remodeling, with constant resorption and deposition of calcium into new bone. The balance between bone resorption and deposition changes

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with age. In aging adults, particularly among postmenopausal women, bone breakdown exceeds the formation, resulting in bone loss that increases the risk of osteoporosis overtime. In menopausal women estrogen production reduces, which leads to increase in bone resorption and decrease in calcium absorption.

Postmenopausal women need to obtain sufficient amount of calcium to maintain bone health and suppress PTH (Mc Kane *et al.*, 1996). Adequate nutrition is essential for the development and maintenance of the skeleton, that is, bone health. Although diseases of the bone such as osteoporosis and osteomalacia, have complex etiologies, the development of these diseases can be minimized by providing adequate nutrients in all periods of the life cycle. Of these osteoporosis is the most common and destructive of productivity and quality of life. The number of older adults (Over age 65 years) in the United states is projected to reach almost by 25% by 2020, a doubling since 1988 (Schneider and Guralink, 1990), greatly increasing the numbers in the population at risk for osteoporosis.

METHODOLOGY

Selection of the subjects :

Subjects were taken from Jodhpur city. Jodhpur is one of the prominent cities of Rajasthan, situated in the west of the state. Three hundred postmenopausal women of 45-55 year residing in Jodhpur city belonging to MIG and HIG were selected on the basic of convenient sampling technique. Willingness of the subjects to co-operate during the study was considered as an important criteria of their selection. After getting their informed consent subjects were apprised of the nature of investigation. The confidentiality of the information so gathered was ensured. The subjects selected for the study were than interviewed to collect all the relevant information with the help of pretested structural interview schedule.

Collection of Data :

An interview schedule was developed to collect detailed information from selected subjects regarding background information (age, religion, type of family, educational status, occupation, food habits), biochemical parameters, orthopedic symptoms, dietary survey, food frequency questionnaire.

Dietary survey :

Dietary survey was carried out to assess nutritional profile of the subjects as a part of the study. A 24-hrs dietary recall method for 3 consecutive days was adopted. The data collected included recording the daily consumption of cereals, pulses, milk and milk products, eggs, meat, sugar and jaggery, fats and oils, vegetables and fruits. Consumption of the cooked foods by the subjects was recorded in standardized volumetric measures and in numbers. These were then converted to raw weight of foods in grams and the nutritive value was calculated using the food consumption tables (Gopalan *et al.*, 2002). Further, nutrient composition of food consumed by the subjects was calculated in terms of energy, protein and calcium by using the food composition tables. The nutrient intake of the subjects was compared with the recommended dietary intake for Indians (ICMR, 2010).

Food frequency questionnaire(FFQ) :

FFQ are a common dietary assessment tool used in large studies of diet and health. In this FFQ, subjects were asked about the calcium rich foods they take daily, alternate, once a week, after a fortnight or once a while and accordingly list was prepared to access how much they take calcium rich foods.

Statistical Analysis of Data :

Observations collected on the various aspects of the study have been statistically analyzed as suggested by Gupta (1997). Frequency and percentage was calculated for each set of observations.

RESULTS AND DISCUSSION

According to the Table 1. The mean daily intake of Energy by vegetarians was 1650.82±88.773 and for ova-vegetarian it was 1780.78±70.653 and for non-vegetarian it was 1911.43±58.018 kcal against the recommended dietary allowances of 1900 kcal (ICMR, 2010). The probable reason for low energy intake in vegetarian and ova-vegetarian must be attributed to lower intake of energy rich foods like cereals, refined grains and jaggery etc as compared to non-vegetarians. The mean intake of Protein by vegetarian, ova-vegetarian and non-vegetarian was 37.39±3.729g, 40.83±0.763g and 44.19±3.835g, respectively, against the RDA of 55g suggested by ICMR (2010). The noted mean value of protein was less than the suggested may be due to the less consumption of protein rich sources like milk, milk products, fish, salmon and egg in all the three categories. The average daily intake of calcium by vegetarian, ova-vegetarian and non-vegetarian subjects was 377.95±39.074mg, 379.42±13.626mg and 365.07±38.744mg, respectively, against the RDA of 600mg suggested by ICMR (2010). The intake of calcium was very less as compared to the suggested value the reason was the less consumption of calcium rich foods by the subjects.

Table 1 : Nutrient consumption				
Nutrients	Vegetarian	Ova-vegetarian	Non-vegetarian	Suggested value (ICMR)
Energy (kcal/d)	1650.82±88.773	1780.78±70.653	1911.43±58.018	1900 kcal/d
Protein (g/d)	37.39±3.729	40.83±0.763	44.19±3.835	55 g/d
Calcium (mg/d)	377.95±39.074	379.42±13.626	365.07±38.744	600 mg/d

Dairy products provide the most readily available sources of dietary calcium, primarily milk, yogurt and cheese. According to Table 2. Milk consumption by the subjects was 92.7% on the daily basis but the quantity vary within the subjects. The results indicate that most of the subjects drink milk but quantity does ‘not found sufficient to meet the requirement of calcium in their diet. The consumption of khoa was found to be negligible. Only 52% subjects use yogurt on the daily basis. The consumption of cheese was less only 6% subjects use cheese once a week. The consumption of buttermilk in Jodhpur is far better than paneer and cheese. 5.3% subjects consume buttermilk daily, 42.7% subjects consume alternate day. The consumption of tofu was very less only 2% subject use tofu once a while. 7.7% subjects

consume soya bean once a week. The consumption of Bengal gram and rajmah was very less. The consumption of green leafy vegetables was 11.3% on the alternate basis. Likewise the consumption of lotus stem was very poor only 7.7% subjects consume lotus stem once a week. Beans consumption was 2.7% alternate day. The intake of lady finger was 4% on the alternate basis. 11.3% subjects consume broccoli once a week. Similarly 29.7% subjects consume spring onion once a week. The intake of sweet potato was 8% once a week. The

Table 2 : Food frequency table					
Name	Daily	Alternate day	Once a week	After a fortnight	Once a while
Milk	278 (92.7)	16 (5.3)			
Khoa			4 (1.3)		95 (37.7)
Milk powder			6 (2.0)		47 (15.7)
Yogurt	156 (52)	125 (41.7)			
Cheese			18 (6.0)	30 (10.0)	107 (35.7)
Paneer		7 (2.3)	97 (32.3)	60 (20.0)	112 (37.3)
Butter milk	16 (5.3)	128 (42.7)	60 (20.0)	31 (10.3)	48 (16.0)
Tofu					6 (2.0)
Soybeans			23 (7.7)	48 (16.0)	51 (17.0)
Bengal gram whole		24 (8.0)	147 (49.0)	71 (23.7)	48 (16.0)
Rajmah			118 (39.3)	82 (27.3)	84 (28.0)
Green leafy vegetable		34 (11.3)	124 (41.3)	68 (22.7)	74 (24.7)
Lotus stem			23 (7.7)	12 (4.0)	51 (17.0)
Beans		8 (2.7)	107 (35.7)	118 (39.3)	57 (19.0)
Lady finger		12 (4.0)	194 (64.7)	76 (25.3)	18 (6.0)
Broccoli			34 (11.3)	40 (13.3)	54 (18.0)
Spring onions			89 (29.7)	18 (6.0)	115 (38.3)
Sweet potato			24 (8.0)	59 (19.7)	71 (23.7)
Carrot		105 (35.0)	96 (32.0)	92 (30.7)	7 (2.3)
Fish		7 (2.3)	11 (3.7)	20 (6.7)	32 (10.7)
Salmon			7 (2.3)		23 (7.7)
Garlic	141 (47.0)	28 (9.3)	25 (8.3)	7 (2.3)	20 (6.7)
Peas		138 (46.0)	99 (33.0)	45 (15.0)	11 (3.7)
Oranges	4 (1.3)	109 (36.3)	77 (25.7)	55 (18.3)	8 (2.7)
Lemon	4 (1.3)	160 (53.3)	68 (22.7)	24 (8.0)	7 (2.3)
Kiwi		15 (5.0)	76 (25.3)	54 (18.0)	17 (5.7)
Blackberries		6 (2.0)	67 (22.3)	39 (13.0)	10 (3.3)
Strawberries		21 (7.0)	119 (39.7)	46 (15.3)	31 (10.3)
Dates dried			111 (37.0)	33 (11.0)	21 (7.0)
Guavas		99 (33.0)	156 (52.0)	8 (2.7)	23 (7.7)
Whole bread	300 (100)				
Almonds		61 (20.3)	115 (38.3)	40 (13.3)	66 (22.0)
Raisins		39 (13.0)	122 (40.7)	43 (14.3)	37 (12.3)
Jaggery		22 (7.3)	82 (27.3)	25 (8.3)	78 (26.0)

intake of carrots was 35% on the alternate basis. Approx 47% subjects consume garlic on the daily basis. Similarly the consumption of peas was 46% alternate day. The consumption of fish and salmon was very less only 2.3% subjects consume fish on the alternate basis. The intake of oranges and lemon was 1.3% on the daily basis. The consumption of kiwi, blackberries and strawberries are 5%, 2% and 7% on the alternate basis. The consumption of whole bread in Jodhpur was 100%. The intake of dried fruits like almonds and raisins was 20.3% and 13.0% on the alternate basis. Dates dried was consumed by the 37% subjects once a week. And the last in the FFQ table the jaggery consumption was 7.3% on alternate basis. It was concluded from the results whether the calcium in foods is high or low, the intake by the subjects was less in quantity so it does not show any relationship with Bone Mineral Density.

Conclusion :

The result of present study revealed that the intake of Energy, Protein and Calcium was very poor in the postmenopausal subjects as compared with the suggested values given by ICMR (2010) in all the three categories *i.e.* vegetarian, ova-vegetarian and non-vegetarian. The intake of energy rich foods, protein rich foods and calcium rich foods was present but the amount was not up to the mark. The intake of milk and milk products was daily but not in sufficient quantity to meet the requirement of calcium. The intake of fruits and vegetables was also low, the ability of calcium from these sources is lower compared to animal source due to their high fiber and oxalate content. For the non-vegetarians fish and salmon are the excellent source of calcium but in Jodhpur city the consumption is negligible.

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