



DIETARY INTAKE OF CALCIUM IN ADULTS

G.GAYATHRI

LECTURER, Department of Clinical Nutrition, Sri Ramachandra University, Porur, Chennai - 600116

Dr. A.J.Hemamalini

PROFESSOR, Department of Clinical Nutrition, Sri Ramachandra University, Porur, Chennai - 600116

ABSTRACT

Introduction: Inadequate Calcium intake can adversely affect bone mineral status. **Aim:** Assessing the average daily calcium intake of adults. **Methods:** Eight hundred subjects were included between the age group 40-60 years. Dietary calcium intake was estimated using a validated quantitative food frequency questionnaire. **Results:** Mean age of the subjects was 49.5 ± 7.2 years. Majorities were belonging to middle-income group. Average calcium intake per day was found to be 425.30 ± 101.71 mg among males and 407.14 ± 107.96 mg among females as against the RDA of 600mg and the major contribution was from milk and its products. There was no statistical difference in the intake of dietary calcium between both male and female subjects while a significant difference ($p < 0.01$) was found when RDA was compared with actual intake. **Conclusion:** Dietary intake of calcium was found to be low across the study population. Hence there is a need for developing and implementing strategies to combat calcium deficiency.

KEYWORDS

Calcium, Food frequency, Questionnaire

INTRODUCTION

The most abundant mineral found in our body, which helps in the maintenance of strength and structure of bones and teeth, along with certain critical metabolic functions, is calcium [1]. Dietary deficiency of calcium is not only responsible for the onset of osteoporosis but also in prevention of diseases like metabolic syndrome and cancer [2].

One of the important impacts on bone metabolism and bone health is dietary calcium intake. Hence, in order to reach the genetically programmed peak bone mass, maintenance of skeletal muscle mass and minimize the age-related bone loss, it is essential to improve the dietary calcium intake in all age groups especially in early stages. In addition to the suboptimal calcium intake when compared with the RDA, the bioavailability of calcium from the diet is another critical factor for the maintenance and development of the bone (3).

Thus, assessing the level of dietary calcium intake of the population to effectively counsel on the proper intake is essential. The present study aims at assessing the average daily calcium intake of adults. University institutional ethics committee approved the study.

MATERIALS AND METHODS

Healthy adults chosen for the study from the suburban areas around Porur, Chennai between 40-60 years of age and not receiving any calcium supplements. The socio economic status was assessed using Kuppusamy classification, (2014). The selected subjects were included in the study after obtaining Informed consent.

Calcium food frequency questionnaire

Dietary calcium intake was estimated using a validated quantitative food frequency questionnaire (4). It comprised of all the food groups that have more than 30mg of calcium per 100gm. The questionnaire also elicits information on the serving size and the frequency of intake. The investigator, a trained dietitian, administered the questionnaire although the questionnaire can be self-administered. The calcium intake of the subjects for a week was elicited using the questionnaire and the average intake per day was calculated from the obtained information.

Statistical Analysis

Variables were analyzed using percentage, mean values and

standard deviations. To compare the mean intake of calcium Student's t-test was used. One - way Anova was used to compare the calcium intake between different age groups and socio economic status.

RESULTS AND DISCUSSION

Eight hundred subjects were recruited with equal distribution of 400 males and 400 females. The characteristic profile of the subjects based on gender and socio economic status is shown in figure 1 and 2. Majority of the subjects were between the age group of 45-49 years followed by 40-44 years and 50-54 years with a mean age of 49.5 ± 7.2 years. Predominantly the subjects were belonging to middle-income group of socio economic status and were moderately active.

Figure 1- Gender profile

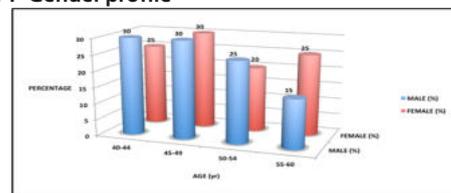


Figure 2- Socio economic status

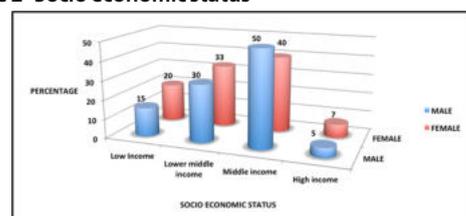


Figure 3- Dietary calcium intake based on gender

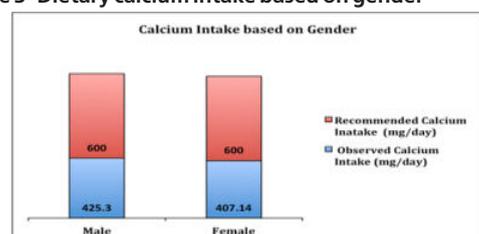
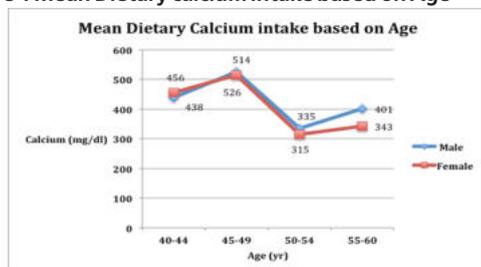


Figure 3 shows the mean intake of calcium. The average calcium intake was found to be 425.30 ± 101.71 mg/day among males and 407.14 ± 107.96 mg/day for females as against the RDA of 600mg (ICMR 2010). No statistical difference in calcium intake was found between male and females ($p=0.23$) whereas a significant difference ($p<0.01$) was found when RDA was compared with actual intake. A similar study also reported a very low intake of calcium among south Indian women (323 ± 66 mg/day) (1). The observed calcium intake in the current study corresponds to 70% of the recommended intake. In developing countries most dietary calcium comes from cereals. Cereals being a moderate source of calcium, the daily intake of calcium is in a low range of 300-600 mg/day in such communities. It is reported that only around 20-50% of the dietary calcium is absorbed. (5).

A similar study (6) also concluded using the same validated quantitative food frequency questionnaire as that of the present study showed that low dietary calcium intake was prevailing in their study population also. The study also showed that dietary calcium intake was positively correlated with low socio economic status and poor knowledge.

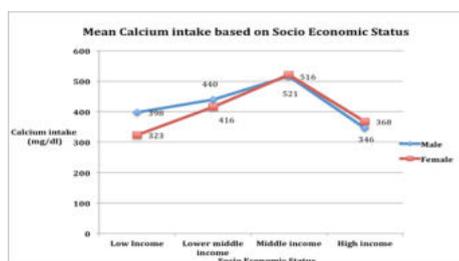
Approximately 700 mg/day of calcium is lost from the body through urine, stools, bile and sweat. However, this loss can be reduced through a process of adaptation involving reduced excretion in spite of low calcium intake. However, considering only 50% of bioavailability of dietary calcium sources (5), the inadequacy of calcium intake observed in this study, reveals that there is a deficit of 400-500g of dietary calcium per day. Thus, there exists a constant risk of imbalance between intake and excretion, even when the body is trying to maintain equilibrium. This cumulative deficit on day-to-day basis would exert an adverse effect on the rate of bone accretion thereby increasing the risk of fragile or osteoporotic bones.

Figure 4 Mean Dietary calcium intake based on Age



The figure 4 shows that there is a gradual increase in calcium intake between 40-49 years of age and drops down between 50-54 years and there has been a slight increase after that. The difference in calcium intake between age groups was statistically significant ($p<0.01$). However, no specific contributing variables were studied further to identify for this variation in calcium intake among the age groups. These observations attempts to highlight the varying calcium intake in different age groups. It has been reported that a highly significant inverse relationship exists between age and absorptive efficiency. (7)

Figure 5 - Mean Dietary calcium intake based on Socio Economic Status



A steady increase in calcium intake was observed as the economic status improved from low to middle income group (Figure 5). However, the high-income group subjects were found to be

consuming lesser calcium when compared with the other two groups, which might be due to the lesser representation of the subjects in the former group. The association between the calcium intakes and economic status was proved to be highly significant ($p<0.01$). Esratajick.,et al, 2014 revealed in their study that postmenopausal women belonging to higher household income per capita had a higher intake of calcium and a significant protective effect against osteopenia/osteoporosis. (6)

The current study found that the calcium source was primarily from milk and its products. Vegetable sources included drumstick leaves and amaranth leaves although the frequency of consumption was found to be weekly once. Other low cost calcium rich sources like *Elucinecoracaa*(Ragi),*Sesamumindicum* (Sesame seeds), and green leafy vegetable like *Sesbaniagrandidiflora* (Agathi) leaves were consumed very rarely. The mean calcium intake of adults was reported to be 737 mg per day in the nationwide survey conducted by USDA on the food consumption in the year 1987-88 with the major contributing factor being milk and milk products at 50% and grains & grain products, legumes, nuts and seeds, vegetables, fruits, meat, poultry, fish and eggs at 30%. The intake also differed among the population based on age, gender, region of the country, household income and ethnic group.

CONCLUSION

The observations in the present study confirm that dietary calcium intake is affected by age and socio economic status and a gross inadequacy of calcium intake was observed among both men and women. The differences in dietary behaviors in different age groups and the influence of their respective socio economic status needs to be evaluated and addressed in order to achieve optimal intake of nutrients

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