

# Sources of dietary calcium in patients attending an osteoporosis clinic

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**Introduction:** Osteoporosis is a common disease that affects both women and men but is more prevalent in postmenopausal women. Reviews suggest that dietary-derived calcium is vital in maintaining adequate calcium balance. Sources of dietary calcium intake among adult patients attending an osteoporosis clinic were reviewed.

**Method:** Two hundred and ninety-one patients attending an osteoporosis clinic were given an eleven-item food questionnaire to complete. The results were compared to the recommended daily allowance of 700 mg.

**Results:** The overall mean intake was 657 mg/day with little difference between age or gender. The best foods for supplying calcium were cheese and milky drinks.

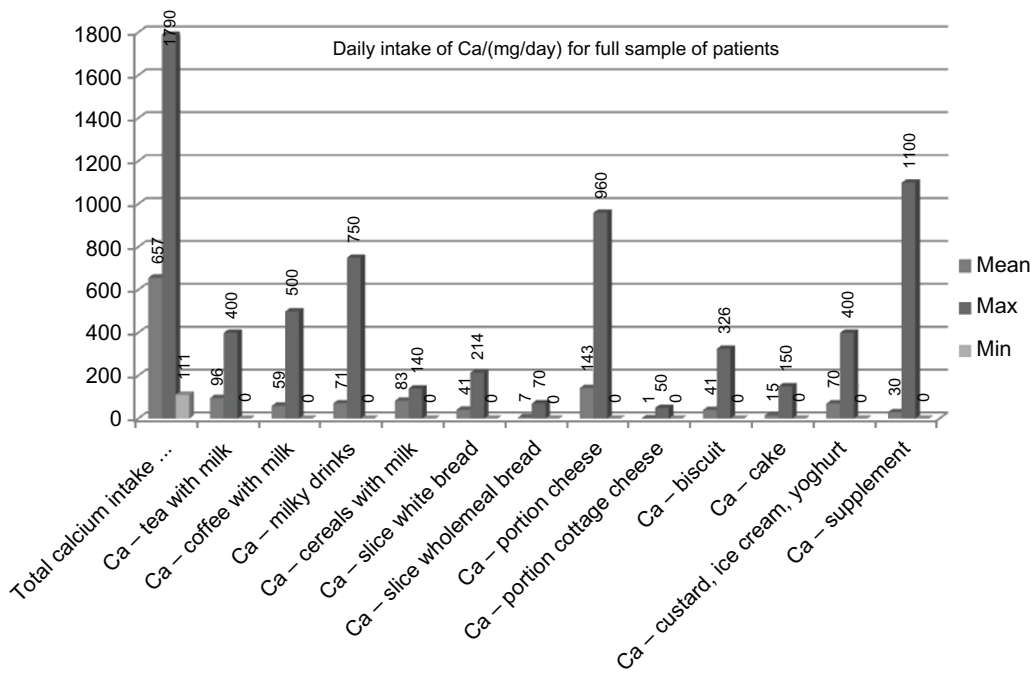
**Conclusion:** This study has confirmed that suboptimal calcium intakes remain common. Dairy sources of calcium remain important. More awareness is needed to convey the importance of dietary calcium and bone health to avoid the development of osteoporosis.

**Keywords:** osteoporosis, clinic, food questionnaire, calcium, dietary intake, bone health

## Background

Osteoporosis affects both men and women but it is particularly common in postmenopausal women. The prevalence of this disease increases with age. Dietary intake of calcium in adult premenopausal women has been positively associated with bone mineral density but is underutilized.<sup>3</sup> Reviews suggest that dietary-derived calcium is vital in maintaining adequate calcium balance.<sup>1</sup> This can also be supplemented with pharmacological derivatives. It has been suggested that postmenopausal women should aim for a dietary intake of 1000 mg calcium per day as this can lead to a 24% reduction in hip fractures.<sup>2,4</sup> This is higher than the 700 mg recommended nutrient intake advised by the Committee on Medical Aspects of Food and Nutrition Policy.<sup>5</sup> Since this study, the guidelines have been changed. The Institute of Medicine, Food and Nutrition Board has recently changed the recommended daily allowance for calcium to 1000 mg/day, based on estimates of requirements of both genders throughout the life cycle.<sup>6</sup> The tolerable upper limit has also been established for this nutrient as 2000 mg/day. During several periods of the female life cycle, calcium intake is critical: prepuberty and adolescence, postmenopause, and during pregnancy and lactation.<sup>7</sup> A previous study showed that increased dietary calcium intake protects against hip fracture.<sup>8</sup> This hypothesis persisted after adjustment for cigarette smoking, alcohol intake, exercise, and obesity. Bones contain 99.5% of the total calcium in the body, and most of this is supplemented from food.<sup>9</sup>

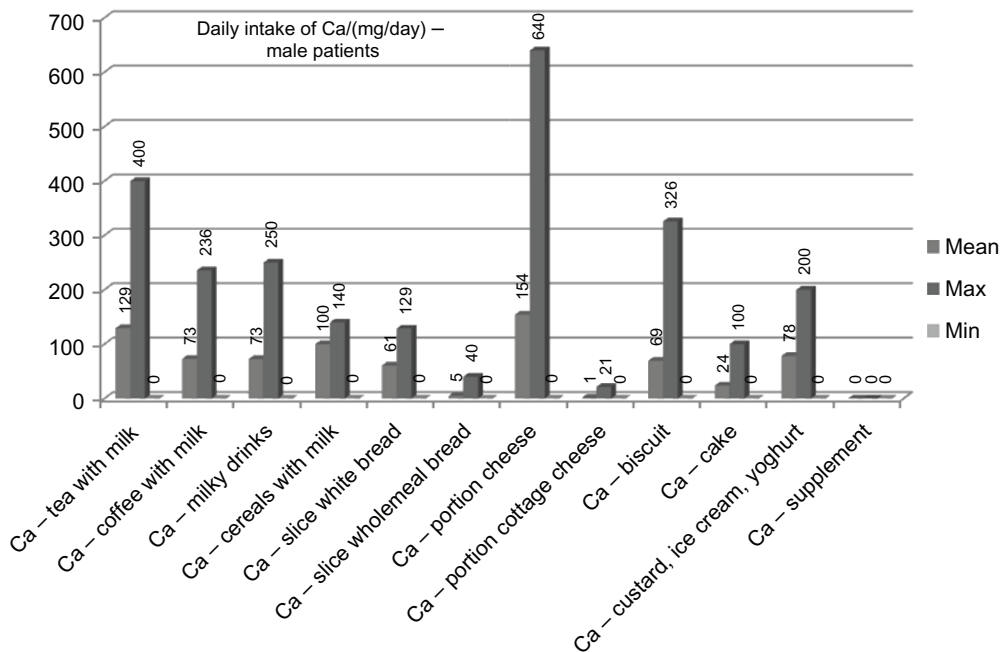
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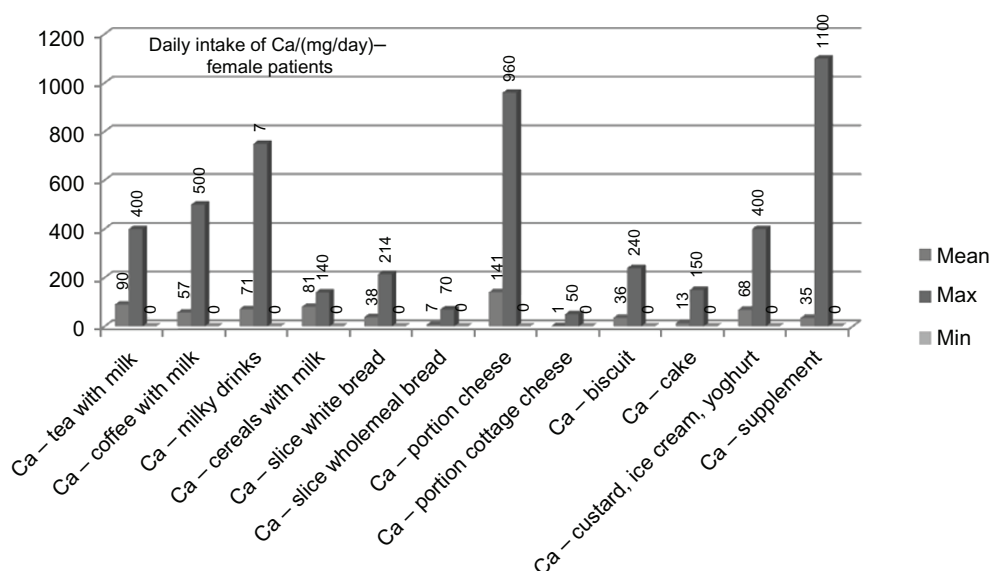
**Figure 1** Daily calcium intake of all patients in the study (n = 291).  
**Abbreviation:** Ca, calcium.

A dietary source of calcium can come from many different food sources including milk, cheese, yogurt, and bread.<sup>10</sup> Guidelines suggest that dietary-derived calcium is as effective as pharmacologically derived sources at maintaining adequate calcium balance.<sup>2</sup>

Recommended calcium intakes vary but should probably exceed 700 mg of calcium daily in most adults.<sup>2</sup> Many patients receive calcium supplements routinely (although adherence is poor), but there is concern that excess calcium supplements might contribute to vascular disease.<sup>11,12</sup>



**Figure 2** Daily calcium intake of male patients (n = 38).  
**Abbreviation:** Ca, calcium.



**Figure 3** Daily calcium intake of female patients (n = 253).  
Abbreviation: Ca, calcium.

In this study, sources of dietary calcium intake among adult patients attending an osteoporosis clinic in Scotland were reviewed.

### Patients and methods

This study included 291 (253 females) consecutive patients aged 22–97 years (mean age: 65 years) attending an osteoporosis

clinic in Scotland over a period of 3 months in 2010. This timeline of clinic sessions was picked at random. Each patient attending the clinic completed an eleven-item food frequency questionnaire, which was validated by the rheumatology department. This was designed prior to the clinic visits and included common foods thought to be high in calcium by a group of consultants and junior doctors. The number of portions per week of foods rich in calcium was recorded for each patient as well as age and sex. Ethics approval was gained from the local hospital.

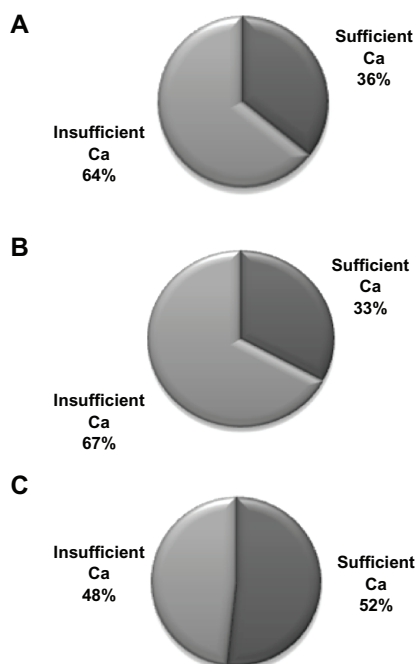
### Results

The overall mean (standard deviation) total elemental calcium intake was 657 (305) mg/day (Figure 1), with 33% of females (Figure 2) and 52% of males (Figure 3) taking > 700 mg/day. The source of calcium food composition data was taken from the United States Department of Agriculture National Nutrient Database for Standard Reference.<sup>10</sup>

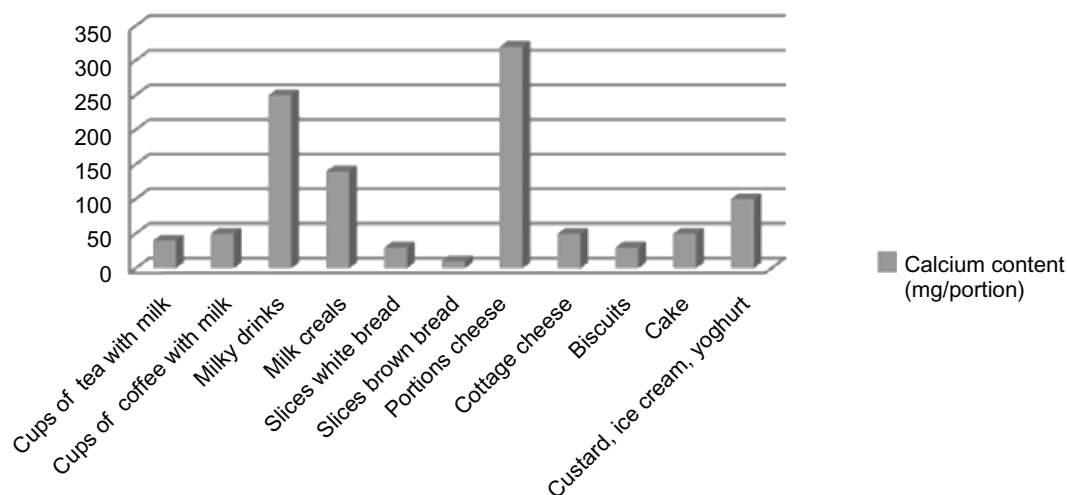
More than half of the subjects (64%) had a calcium intake of <700 mg daily, and only 11% consumed > 1 g daily (Figure 4).

The best foods for providing calcium are cheese, milky drinks, cereals with milk, and custard, ice cream, and yogurt (Figure 5). The portion size was defined from an average after discussion with patients (Table 1).

The top six calcium-providing food groups for the sample of patients were cheese, tea with milk, cereals with milk,



**Figure 4** Percentage of (A) all patients, (B) females, and (C) males receiving the correct amount of calcium (>700 mg elemental calcium daily).



**Figure 5** The best sources of dietary calcium.

**Table 1** The best foods for providing calcium and average portion size

Food group	Portion size
Tea with milk	30 mL
Coffee with milk	30 mL
Milky drinks	250 mL
Cereal with milk	100 mL
Slice of white bread	1 slice
Slice of brown bread	1 slice
Portion of cheese	30 g
Portion of cottage cheese	40 g
Biscuits	1 biscuit
Cake	1 piece
Ice cream, yogurt, custard	150 mL

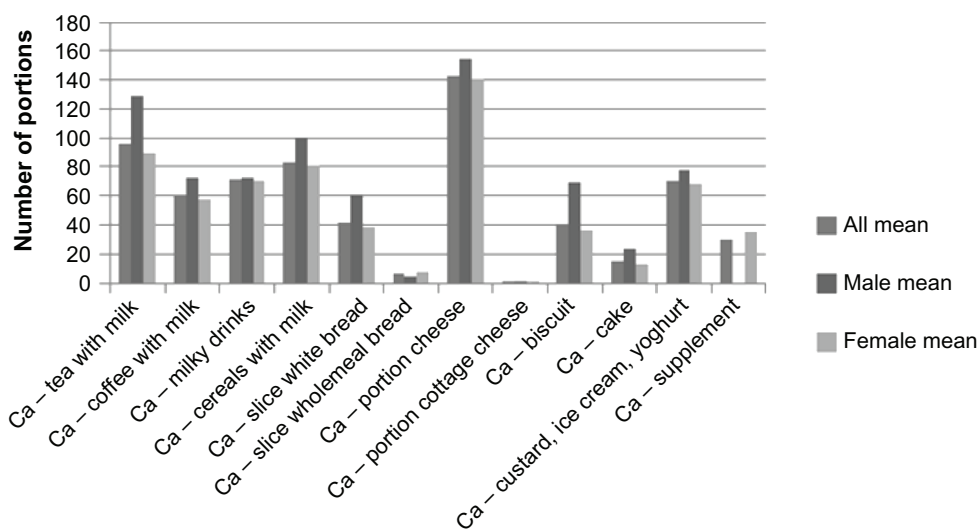
milky drinks, custard, ice cream, and yoghurt, and coffee with milk (Figure 6).

The main source of calcium across all age groups in this study was from cheese, as it is a rich source of this element.

Calcium intake varied by age group with the 21–40 and 81–100 year olds taking in more calcium than the 41–60 and 61–80 year olds (Figure 7). This may not be significant due to the reduced number of patients in the 81–100-year-old group.

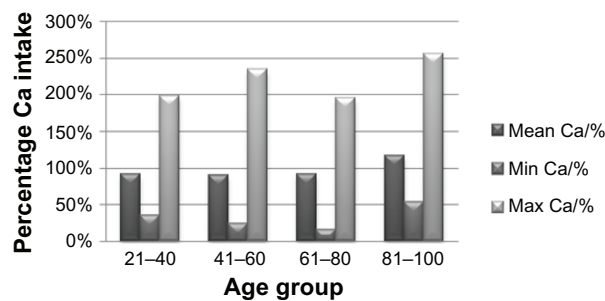
## Discussion

The selection of patients in this study may not be representative of the whole population in terms of their calcium



**Figure 6** The source of calcium for all patients (n = 291).

**Abbreviation:** Ca, calcium.



**Figure 7** Calcium intake by age group.  
**Abbreviation:** Ca, calcium.

intake. As they are attending an osteoporosis clinic they may conceivably take less calcium, which is one of the reasons they have osteoporosis, or they are aware of their osteoporosis and they take more calcium. Therefore, this may not be an average representative. The food frequency questionnaire was a limitation in this research as it did not include questions about other sources of calcium such as nondairy. This was in order to make the questionnaire a reasonable length to enable it to be distributed at a clinic. Also, average portion sizes were used, which may differ from patient to patient.

An area of interest in this study is the fact that most calcium intake was from cheese. This may affect cardiovascular health. Therefore, healthier options could be advised to patients such as broccoli or fish. It was noted that patients drink a lot of milk in caffeinated beverages. It is also unfortunate that the antioxidant benefits of tea are attenuated by the addition of milk, along with the absorption of calcium.<sup>13,14</sup>

Results from other studies have similarly shown a lack of dietary calcium intake throughout the population and an increased intake of cheese.<sup>15,16</sup> More awareness is needed and more advice should be given to patients about the importance of calcium intake in relation to osteoporosis and the beneficial healthy sources of calcium available.

## Conclusion

This study has highlighted that suboptimal calcium intakes remain common; although universal calcium supplementation according to guidelines is not always required.<sup>2</sup> Dairy sources of calcium remain important. Dietary intake does not differ between gender, with the main source of calcium being from cheese. Future studies should include estimates of potentially healthier sources of calcium such as broccoli, almonds, and bony fish.<sup>10</sup> In conclusion, more awareness about the importance of dietary calcium and bone health is needed to avoid the development of osteoporosis.

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## Disclosure

The author reports no conflicts of interest in this work.

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