

Revisiones

Review and future perspectives on recommended calcium intake

E. Rodríguez-Rodríguez, B. Navia Lombán, A. M.^a López-Sobaler and R. M.^a Ortega Anta
(Grupo de investigación: 920030)

Departamento de Nutrición. Facultad de Farmacia. Universidad Complutense. Madrid. Spain.

Abstract

The suitability of recommended calcium intakes has been the subject of debate in recent years. The present work reviews the recommendations currently made for different population groups in Spain and other countries. To date, these recommended intakes have mainly been based on the role of calcium in the formation and maintenance of bone; less attention has been paid to its other roles in health (e. g., its effect on blood pressure, the prevention of cancer or the regulation of body weight), or the interaction of calcium with other nutrients. However, an increasing number of reports highlight the importance of calcium in these other areas – information that should be taken into account when assessing the suitability of recommended calcium intakes. It should also be remembered that the calcium intakes of a large proportion of the population are lower than those recommended. This paper reviews the suitability of current calcium recommendations for different groups of the population and highlights the areas where research is needed to help determine the intakes that would provide the greatest short and long term health benefits.

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Introduction

From a health point of view, an adequate calcium intake is essential for acquiring and maintaining an acceptable bone mass and for the regulation of body weight. It may also provide protection against high blood pressure and certain types of cancer. The contin-

REVISIÓN Y FUTURAS PERSPECTIVAS SOBRE LAS INGESTAS RECOMENDADAS DE CALCIO

Resumen

La adecuación de las ingestas recomendadas para el calcio ha sido objeto de debate en los últimos años, por ello en la presente revisión se hace un resumen de las recomendaciones, nacionales e internacionales, que existen actualmente sobre la ingesta de calcio en diferentes grupos de población. Para marcar dichas ingestas hasta el momento se ha tenido en cuenta, fundamentalmente, el papel del calcio en la formación y mantenimiento de la masa ósea, prestando menos atención a su interacción con otros nutrientes y a otras funciones de este mineral en la salud, como su efecto sobre la tensión arterial, prevención del cáncer o regulación del peso corporal. Sin embargo, cada vez hay más estudios que ponen de manifiesto la implicación del calcio en dichos aspectos, por lo que deben tenerse en cuenta a la hora de evaluar la adecuación de las actuales ingestas recomendadas, sobre todo teniendo en cuenta que una gran parte de la población no llega a cubrir dichas recomendaciones. Se señalan aspectos en los que es necesario investigar en el futuro para ir perfilando los aportes del mineral que pueden condicionar mayores beneficios sanitarios a corto y largo plazo.

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uation of research on the calcium status of different population groups is therefore justified, as is the evidence-based modification of recommended intakes (RI).

Current calcium recommendations

Calcium has long been known essential for the maintenance of good bone health; indeed, it is its main component.¹ Bone mass increases after birth, reaching a higher peak in men than in women after puberty, usually at some point between 19 and 30 years of age. When full adulthood is reached it gradually declines.²

Correspondence: Elena Rodríguez-Rodríguez.
Departamento de Nutrición.
Facultad de Farmacia. Universidad Complutense.
28040 Madrid. España.
E-mail: elerodri@farm.ucm.es

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It is important to achieve an adequate bone mass during infancy and early youth in order that the peak bone mass achieved is that which is genetically possible. It has been estimated that a 10% increase in the bone mass peak could reduce osteoporotic fractures during adulthood by 50%.³

Several studies have shown that an increase in the calcium intake is related to the achievement of a greater bone mass, and therefore a higher bone mass peak.⁴ In fact, the reference nutrient intakes (RNIs) for calcium for the UK population^{5,6} were designed with the aim of promoting higher bone density and avoiding osteoporotic fractures (table I).

Apart from its well known role in bone development and maintenance, calcium appears to have other functions that are beneficial to health. For example, it is thought to protect against high blood pressure and colon cancer. These aspects were taken into account when adequate intakes (AI) of calcium were established for the different age and sex groups of the US and Canadian populations.⁷

Calcium recommendations: things to bear in mind

Role of calcium in health

Different studies performed after the establishment of the above RNIs^{5,6} and AIs⁷ for calcium lent weight to the idea of a role for this mineral in the fight against high blood pressure and colon cancer, and even suggested calcium might have a role in weight control.

Some studies have related the intake of calcium and the consumption of milk products with a better control of blood pressure.⁸⁻¹¹ In a study of 82 pregnant women, Ortega et al.¹² observed that calcium intake was lower among those who suffered high blood pressure than among those who were normotensive (757.7 ± 154.5 mg/day compared to 986.4 ± 502.3 mg/day). Similarly, Morikawa et al.⁹ found a significant, negative association between blood pressure and calcium intake in a sample of 476 subjects aged between 20 and 59 years; an increase in calcium intake seemed to lower blood pressure independent of the action of other minerals such as sodium or potassium.

Though no clinical trials indicate any clear relationship between calcium intake and colon cancer, it has been reported that calcium supplementation reduces the risk of suffering recurrent adenoma (a precursor of colorectal cancer).¹³ Indeed it has been suggested that calcium supplements could be of benefit to persons with a background of adenomatous polyps. Weingarten¹⁴ reported that the use of calcium supplements of 1200 mg/day over four years, and of 2000 mg/day over three years in patients with prior adenomas, significantly reduced the risk of recurrent colorectal adenoma (OR 0.74, 95%CI 0.58-0.95).

Table I
Calcium recommendations for different groups in different countries

	RNI (mg/day)*	AI (mg/day)†	RI (mg/day)‡
0-6 months	525	210	250
7-12 months	525	270	300
1-3 years	350	500	500
4-6 years	450	800	800
7-8 years	550	800	800
9 years	550	1,300	800
10 years	550	1,300	1,300
11-18 years			
men	1,000	1,300	1,300
women	800	1,300	1,300
19-50 years			
men	700	1,000	1,000
women	700	1,000	1,200
51-70 years			
men	700	1,200	1,200
women	700	1,200	1,200
>70 years			
men	700	1,200	1,200
women	700	1,200	1,300
Pregnancy	NI	1,000	1,400
Lactation	+ 550 (in doubt)	-	1,500

NI: no increase recommended.

*RNI: Reference nutrient intake for the UK^{5,6}.

†AI: Adequate intake for the US and Canadian populations⁷.

‡RI: Recommended intake for the Spanish population²².

Finally, calcium probably plays a role in the regulation of body weight since its intake leads to a reduction in the levels of parathyroid hormone and 1,25-dihydroxyvitamin D; this would favour a reduction in intracellular calcium that in turn would promote lipolysis.¹⁵ Increased calcium ingestion also leads to an increased faecal fatty acid content, with the consequent loss of energy.^{16,17} An increase of 300 mg/day of calcium was deemed sufficient to lead to a loss of 3 kg of body fat in adults and of 1 kg in children.^{18,19} Several authors indicate that for calcium to reduce body weight other bioactive compounds present in milk products are also necessary.^{20,21} For example, Zemel et al.²¹ studied 32 obese subjects whom they subjected for 24 weeks to the same hypocaloric diet but with different levels of calcium: standard (400-500 mg/day), calcium rich (800 mg/day, of which half came from supplements), and milk product-rich (providing 1200-1300 mg/day of calcium). They reported these subjects to lose 6.4%, 8.6% and 10.9% of their body weight respectively. The fact that the greatest weight loss was seen among those whose calcium

intake was highest supported the idea that calcium was involved in the regulation of body weight, but the same results also suggest that bioactive components present in milk products might be needed.

Bearing in mind all the above findings, as well as the results of studies performed on the Spanish population, in 2004 the *Departamento de Nutrición* set out recommended intakes (RIs) for this mineral,²² defined as the amount of calcium recommended to cover the needs of practically the entire population.²³ These were somewhat higher (mainly for the adult population) than the RNIs for the UK population,^{5,6} and slightly higher than the AIs for the US and Canadian populations⁷ (table I). Since then research has continued into the role of calcium and the findings made need to be taken into account when reviewing calcium intake recommendations.

Factors to take into account when setting calcium recommendations

With regard to the prevention of osteoporosis, some studies have cast doubt on the suitability of the RNIs mentioned above since, in some populations in which calcium intake is very low and whose members have low bone mineral densities (BMD), the prevalence of osteoporotic fractures is low.²⁴ This might be due to genetic differences, different rates of physical exercise, the intake of other nutrients, special bone structure characteristics, or the interaction of these factors.²⁶⁻²⁸ Such factors might need to be borne in mind when setting calcium recommendations.

Recent studies have reported a role for physical activity in the increase of bone mass during adolescence and the prevention of bone loss after the menopause,^{29,30} and suggest that immobilisation leads to the loss of bone mass independent of calcium intake.³¹ In addition, although both the performance of weight-bearing exercise (in which muscles and bones work against gravity, e.g., walking, running, dancing, hiking, football etc.) and an adequate intake of calcium (about 1,000 mg/day) appear to be necessary for optimising bone health in children and adolescents, exercise would appear to be the more important since it has a direct effect on bone mass and structure.³² This raises the question of whether active people need different RIs to sedentary people.

Although at the time when the recommendations for calcium were being put together it was known that a high intake of salt led to the elimination of calcium in the urine, it had not been shown that the intake of sodium had any effect on bone loss or the risk of fractures. It was therefore decided not to take the high salt intake characteristic of developed societies into account.^{7,22} However, while there have been few advances in this area, some reports now relate sodium intake to the risk of osteoporosis. In a recent

study of 271 post-menopausal women it was found that those who took 4,031 mg/day sodium were 2.98 times more likely to suffer from osteoporosis than those who took < 2,628 mg/day (OR = 2.98; 95% CI 1.42-4.23).³³ This shows that sodium could have effects on bone health and highlights the importance of continuing research in this area.

Although a high protein intake increases the elimination of calcium in the urine, a low intake has been associated with the slower recovery of osteoporotic hip fractures.³⁴ When the calcium recommendations were established their adjustment for protein intake was not considered necessary,^{7,22} even though some authors had established that a calcium/protein ratio of > 20 mg/g is necessary to protect the bone from demineralization.³⁵ Other work in this area has shown that, even if the calcium intake is adequate, if the protein intake is low no benefit is gained with respect to reducing the risk of fractures.³⁶ However, bearing in mind that the current protein intake of populations in developed nations is very high,³⁷ more studies should be performed to determine whether protein intake should be taken into account when establishing calcium recommendations.

At the time when the calcium recommendations were established an association had been reported between caffeine intake and bone loss in post-menopausal women with low calcium intakes,³⁸ but it was believed there was insufficient evidence to recommend different calcium intakes depending on caffeine consumption.^{7,22} Later, in a study on 489 women aged between 65 and 77 years, it was observed that a caffeine intake of > 300 mg/day was associated with increased bone loss in the vertebral column independent of calcium intake. In addition, it was associated with a reduced BMD, an effect more obvious when calcium intake was low.³⁹ These findings, however, come from just one study, and it would be interesting to continue research that could determine whether the effect of caffeine consumption on BMD should be taken into account when establishing calcium recommendations.

Phosphorus is involved in bone formation and affects calcium metabolism; it is therefore important that the balance between these nutrients is adequate. It has been estimated that a calcium intake of > 1,000 mg/day and a Ca/P ratio of > 0.74 in young women is associated with better BMD values than lower figures for these variables.^{40,41} Although to date phosphorus intake has not been taken into account when establishing calcium recommendations, a Ca/P ratio of 1:1-2:1 has been proposed as a nutritional objective for the Spanish population.²² According to the results of future investigations, it may become advisable to adjust calcium recommendations according to the phosphorus intake.

Finally, fibre (mainly found in vegetables and whole grains) and the different compounds associated with it, can interfere with the absorption of cal-

cium.⁴² Vegetarians could therefore be more susceptible to calcium deficit. Although there have been few studies on the bone health of this subpopulation, some results suggest that the BMD of vegetarians is lower than that of non-vegetarians.^{43,44} Nonetheless, the less acidic residue of a vegetarian diet could be beneficial to bone health.⁴⁵ Clearly, more studies are needed to confirm the risk of osteoporosis faced by vegetarians before any specific recommendation regarding calcium intake can be given. With the intention of promoting bone health among vegetarians, a report of the American Dietetic Association only recommended promoting the consumption of foods that could provide an adequate supply of calcium.⁴⁶

Review of the calcium recommendations for different age groups

During infancy (1-9 years), an appropriate calcium intake is vital if an adequate bone mass is to be attained. Most placebo-controlled studies involving children in which milk products or calcium supplements (600-800 mg/day and 1,000-1,300 mg/day) were administered have shown these to improve bone mineral acquisition.⁴⁷

It has been reported that the percentage body fat and body weight of children decreases with calcium intake.^{48,49} This is particularly important information given the child obesity figures of recent decades. In addition, calcium intake also appears to favour children's cardiovascular health. In a study of 105 children aged 2 to 5 years, Ortega et al.⁵⁰ reported that those whose calcium intake was 868.8 ± 147.7 mg/day (≥ 1 portion/day of milk products) had significantly lower serum cholesterol levels than those who took 744.8 ± 218.0 mg/day (< 1 portion/day of milk products) (4.23 ± 0.73 mmol/L compared to 4.54 ± 0.74 mmol/L respectively, $p < 0.05$). Since then few studies in this area have been performed, although in a study involving 4,374 children from England and Scotland followed over 65 years⁵¹ it was reported that those who took more calcium during their infancy ($683-2,198$ mg/day) had a lower risk of death by brain haemorrhage (OR = 0.41; CI: 0.16-1.05; $p = 0.04$) than those whose intakes were smaller (150-397 mg/day).

Bearing in mind these results, and given the essential role of calcium in the acquisition of bone mass during infancy, it might be a good idea to increase the RNIs and RIs for the English and Spanish populations respectively to at least the 1,300 mg/day indicated for the US and Canadian infant populations (table I).

During adolescence (10-18 years), calcium intake is essential for achieving an optimum BMD; this should help prevent fractures produced by osteoporosis in the future, especially in women. In agree-

ment with the results of other studies performed in adolescents, Harkness and Bonny⁵² reported that calcium intakes of 1,200-1,600 mg/day had a positive effect on bone health. In another study, which involved 51 pairs of premenarcheal twins, it was shown that following a diet rich in calcium (diet + supplements = 1,631 mg/day) led to a significant 3.7% ($p < 0.05$) increase in bone mineral content over a diet poor in calcium (718 mg/day).⁵³

Calcium is also important during adolescence for its effect on body weight. In a study on 121 adolescents (14.9 ± 2.2 years), calcium intake (adjusted for energy intake) was found to be inversely related to body weight ($r = -0.194$, $p = 0.03$) and body mass index (BMI) ($r = -0.185$, $p = 0.04$). In addition, those adolescents with a calcium intake in the lowest quartile (283.9 ± 91.6 mg/day) had a higher BMI than those in the first quartile ($1,003.0 \pm 191.3$ mg/day) (29.7 ± 7.4 compared to 26.8 ± 7.3 kg/m²).⁵⁴ Similarly, in a group of adolescents aged 16.6 ± 1.3 years, among whom 47 were of normal weight and 96 were obese, the mean calcium intake (adjusted for energy intake) was 692.1 ± 199.5 mg for the former and 585.2 ± 249.9 mg for the latter. Those with a calcium intake in the lowest quartile (403.57 ± 184.81 mg/day) had more body fat than those in the highest quartile (890.52 ± 200.45 mg/day) ($37.1 \pm 8.3\%$ compared to $28.4 \pm 10.7\%$; $p < 0.05$). In this same study it was observed that the prevalence of resistance to insulin was greater among the former group than the latter (OR = 3.24; 95%CI: 1.11-9.54; $p = 0.02$).⁵⁵ Calcium would therefore also appear to play a role in the prevention of metabolic syndrome in adolescents.

Currently, the recommendation for calcium intake in adolescents is no higher than 1,300 mg/day. Given the evidence available for this subpopulation, this figure should probably be maintained. However, it is important to point out the low RNI for calcium for adolescents in the UK^{5,6} (table I), which neither reaches the 1,200 mg/day thought to be needed for positive bone health⁵⁶ nor the 1,000 mg/day thought to be required for physical activity to have a beneficial effect on the BMD.⁵⁷

Although 90% of the bone mass has formed by 18 years of age, the peak is not reached until 25-30.⁵⁸ Maintaining an adequate calcium intake during this part of adult life is therefore important – especially in women – if optimum bone health is to be achieved.⁵⁹ Indeed, until the age of 50 the calcium intake should be sufficient to maintain the BMD reached during infancy and adolescence.⁶⁰

As mentioned above, calcium also has an effect on body weight and body composition. In a six month clinical study it was seen that obese women who took in calcium at 1,200 mg/day (three servings of milk products/day) lost 5.4% of their body fat without a loss of weight; the control group, whose members followed a diet poor in calcium and milk products)

experienced no significant reduction in percentage body fat.⁶¹ Recently, in a study on the relationship between dietary calcium, BMI and percentage fat mass in 3,638 subjects aged 47-79 years, Eilat-Adar et al.⁶² reported that these latter two variables were 0.8 kg/m² and 1.28% lower, respectively, in subjects with a higher calcium intake (≥ 873 mg/day) than in those with a lower intake (< 313 mg/day).

The anti-obesogenic effects of extra calcium are more evident when a subject's habitual calcium intake is low.⁶³ This could partly explain why, in some studies, calcium supplements have not favoured weight loss nor prevented weight gain in overweight/obese subjects.⁶⁴

A relationship also seems to exist between calcium intake and the control of blood pressure, although the results obtained to date have been inconclusive. In an analysis of 13 clinical trials performed to study the effect of calcium supplements on blood pressure, it was observed that those who received such supplements experienced a significant reduction in systolic blood pressure (a mean fall of 2.5 mmHg, 95% CI 0.6-4.5), but not in diastolic blood pressure (mean fall 0.8 mmHg, 95% CI: 0.4-2.1) compared to controls. However, given the low quality and heterogeneity of the trials included in the analysis, the findings in favour of a causal relationship were weak and probably owed to bias. Longer-running, better quality, double-blind clinical trials are needed to determine whether calcium supplementation truly affects blood pressure.⁶⁵

Given that in recent years novel results have been obtained regarding the role of calcium during adulthood, it would appear reasonable to maintain the recommendation of 1,000-1,200 mg/day established for the US, Canadian and Spanish populations, although it would seem to be necessary to increase the 700 mg/day recommended for the English population (table I).

People over 50 years of age experience a reduction in the intestinal absorption of calcium along with progressive bone loss. The latter is more intense in women than men, mainly due to the changes in oestrogen level that occur after the menopause, although body weight and the intake of certain nutrients are also factors involved.⁵⁸ Certainly, it has been confirmed that a low calcium intake is related to bone loss and the risk of fractures in this group.⁶⁶ In a study of 36,000 women it was observed that the risk of hip fractures was reduced by 29% in those who took daily calcium (1,000 mg) and vitamin D (400 IU) supplements compared to those who took a placebo.⁶⁷ In a five-year, placebo-controlled study involving women aged over 70 years, a 34% reduction in fractures was seen among those administered a daily 1,200 mg of calcium – at least among the 57% of subjects known to have taken 80% of the supplement.⁶⁸

In postmenopausal women it has also been noted that an increased calcium intake is associated with a

reduced risk of metabolic syndrome^{69,70} and high blood pressure.⁷¹ In a study of 10,066 women aged over 45 years it was observed that those who had a calcium intake in the highest quintile (1,586 mg/day) had less chance of developing metabolic syndrome than those with an intake in the lowest quintile (516 mg/day) (OR = 0.66; CI: 0.55-0.80; $p < 0.0001$) after adjusting for age, physical activity, energy intake, alcohol intake, the use of multivitamin supplements, and a history of myocardial infarction before 60 years of age.⁶⁹ In another study of 28,886 American women over 45 years of age it was seen that the risk of high blood pressure was lower (OR = 0.87; 95% CI 0.81-0.93; $p < 0.0001$) for those with a calcium intake in the highest quintile (1,000-2,559 mg/day) than for those with a calcium intake in the lowest (198-558 mg/day) after adjusting for age, race, energy intake, use of tobacco, BMI, history of hypercholesterolaemia, diabetes and the intake of sodium, saturated fatty acids and cholesterol.⁷¹

In studies involving elderly adults, the benefits of a high calcium intake were recorded with respect to the risk of certain types of cancer, particularly colorectal cancer. In a review of 10 studies performed in five countries it was concluded that a high calcium intake is associated with a lower risk of developing colorectal cancer. Compared to subjects with calcium intake of < 500 mg/day, those whose intake was 1,300 mg/day had a 74% (95% CI 62-88) lower risk of developing colorectal cancer ($p < 0.001$).⁷² In a recent seven-year study involving 53,570 subjects aged between 50 and 70 years, it was reported that the calcium intake was inversely related to the risk of cancer of the digestive system; those with the highest intake (1,239 mg/day in men and 925 mg/day in women) were at lower risk than those with the smallest intake (491 mg/day in men and 451 mg/day in women) (0.84, 95% CI 0.77-0.92 in men, and 0.77, 95% CI 0.69-0.91 in women). This was particularly true with respect to colorectal cancer.⁷³ However, in intervention studies in which subjects were administered calcium supplements, levels of 1,000-2,000 mg/day reduced the recurrence of adenoma in individuals previously affected, but had no effect on the incidence of colorectal cancer in those with or without risk factors for this disease.^{74,75}

The above results suggest it might be a good idea to increase the recommendations regarding calcium intake to 1,300 mg/day in people aged 50 years or more. Calcium is not so important for bone formation at this age, but it remains essential for preventing bone loss and because it provides other health benefits such as the prevention of fractures, metabolic syndrome, and perhaps colorectal cancer – all of which are more frequent during this period of life. Increasing the recommendation to this level would still be safe; the maximum safe limit established for this subpopulation is 2,500 mg/day.⁶

During pregnancy the need for calcium increases because of foetal bone mineralisation and increased maternal requirements.⁷⁶ This can be covered by adaptations of the body, such as the increased intestinal absorption of calcium, increased calcium retention at the kidney, and the mobilisation of maternal skeletal calcium.^{77,78} However, increasing the calcium intake could help prevent such bone reabsorption. A calcium intake of 1,200 mg/day during the third trimester of pregnancy reduces maternal bone resorption by an average of 13.6 nM BCE/mM creatinine (14%), as reflected by urinary N-telopeptide crosslinked type 1 collagen (NTx) levels.⁷⁹ In fact, for each 300 mg of calcium intake there is an estimated reduction in the NTx level of 4.8 nmol BCE/mmol of creatinine.⁸⁰

Calcium can also reduce the blood pressure of pregnant women independent of the action of other minerals such as sodium and potassium. Recent studies have confirmed the benefits of calcium supplements in the prevention of preeclampsia.⁸¹⁻⁸⁴ In a study of 524 pregnant women⁸⁴ it was reported that supplementation with 2,000 mg calcium per day reduced the incidence of preeclampsia compared to women with calcium intakes of < 1,000 mg/day.

In a recent study involving 763 Japanese women⁸⁵ it was reported that increasing the calcium intake during pregnancy reduced the risk of infant wheezing. However, more work is needed to confirm this.

In agreement with the available evidence it would seem that intakes of 1,000 mg/day and 1,400 mg/day (the quantities recommended for pregnant women in the US/Canadian and Spanish populations [table I]) are adequate for preventing maternal bone reabsorption during pregnancy and preeclampsia. The UK RNI, which is < 1,000 mg/day (i.e., below the threshold level thought to provide health benefits) (table I), might, however, need revising.

Finally, calcium plays an essential role in lactation; certainly, it is during this time that maternal BMD values can be notably reduced.⁸⁶ Several reports indicate the benefits of a calcium intake of 1,335-1,500 mg/day in preventing this loss.⁸⁷ An adequate intake during lactation could also ensure a higher milk calcium concentration, and therefore provide the newborn with greater quantities. Ortega et al.⁸⁸ reported that women with an intake of < 1,100 mg/day (percentile 75) had lower mature milk calcium concentrations than those whose intakes were higher (5.95 ± 1.56 mmol/L compared to 6.82 ± 1.31 mmol/L; $p < 0.05$).

These benefits were taken into account when the recommended intake of 1,500 mg/day for lactating mothers was set for the Spanish population in 2004.²² Since no findings that might change this recommendation have been made since then, the recommendation should hold. However, the recommendations for the US/Canadian and UK populations (table I) should be revised.

Current intakes of the Spanish population

In a national study undertaken by the *Fundación Española de la Nutrición* (FEN) and the *Ministerio de Medio Ambiente y Medio Rural y Marino*,³⁷ it was estimated that the mean calcium intake of the Spanish population in 2006 was 871 mg/day – somewhat below the mean recommended value²². In the UK, the mean intake for the general population has been reported adequate with respect to the corresponding RNI.⁸⁹ However, when the calcium intakes of UK subpopulations were examined, it was found that more attention needed to be paid to ensuring an adequate intake in children. The same was true for young people of post-pubertal age (when the peak bone mass is reached) and the elderly.⁸⁹ Studies in Spain have reported similar results. In a study of 87 women aged 18-35 years from the Madrid Region, the mean calcium intake was 802.1 ± 258.7 mg/day, reflecting an intake below that recommended in 45% of subjects.⁴⁰ In a study of 128 children aged 7-10 years the mean intake was estimated at $1,022 \pm 265$ mg/day – below that recommended in 19%.⁹⁰ Finally, in a study of 183 institutionalised elderly people from the region of Madrid, the mean calcium intake was 767.4 ± 170.6 mg/day; none of these subjects met the RI.⁹¹

In agreement with that stated by the National Medical Association, these results show that the intake of calcium for the general population should be increased,⁹² especially in the young and elderly.⁸⁹

Conclusion

The beneficial effects of calcium on BMD and bone health have long been known. These effects have been borne in mind by different institutions when setting calcium recommendations. However, recent work has suggested calcium has an effect on body weight, blood pressure, cardiovascular disease and certain types of cancer. This suggests we should rethink the calcium recommendations for some sectors of the population. In addition, greater efforts should be made to ensure that RIs for calcium are met; only then can the health benefits of this mineral be enjoyed. Special attention should be paid to those subpopulations whose calcium intakes are below those recommended.

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