

Does a patient's knowledge about osteoporosis have an influence on calcium intake?

Irena Colić Barić, Zvonimir Šatalić, Zlatko Giljević, Franjo Škreb,
Inga Koren-Kesner

Original scientific paper – Izvorni znanstveni rad

UDC: 637.046

Summary

The aim of the study was to determine if calcium intake in patients with osteoporosis and osteopenia is influenced by the patient's knowledge about the disease. The results presented are collected from an ongoing survey on dietary and other behaviour in women with lower bone density.

Subjects were 197 women with an average age of 62.9 years. Specially designed quantified Food Frequency Questionnaire (FFQ) and, additional questionnaire for demographic data were used.

When asked in what period of life they consumed the highest quantity of milk and dairy products, in the highest percent of subjects (27.8%) the answer was after the age of 50 years. In this case, although not significantly, the ages are negatively correlated with calcium intake. Years of education did not significantly correlate with calcium intake. Subjects that knew the recommended calcium intake in average had also a higher calcium intake (1369.6 mg) than those who did not (929.2 mg) and had significantly higher ($p = 0.01$) supplemental calcium intake than those who did not know the recommended calcium intake. No significant difference in calcium intake was observed when osteoporosis, reported in family anamnesis, is taken into account. The period of time from diagnosis did not correlate with calcium intake. Significant correlation ($p < 0.01$) was observed for calcium intake as well as the number of correct answers on questions about osteoporosis and food checklist where benefits of calcium sources are recognize.

This study showed that a patient's knowledge about osteoporosis is important in achieving adequate calcium intake.

Key words: osteoporosis, Food Frequency Questionnaire (FFQ), calcium, nutrition knowledge

Introduction

Osteoporosis is irreversible; however, it may be prevented by maximizing peak bone mass during the first 2 to 3 decades of life in order to sustain bone health during natural periods of bone loss (menopause and aging) (Position of

ADA and Dietitians of Canada, 1999). Women are 4 times more likely to suffer from osteoporosis than men (Position of ADA and Dietitians of Canada, 1999).

There is a rise in obligatory calcium excretion at menopause, which increases the theoretical calcium requirement in postmenopausal women. Adequate calcium intakes have been convincingly shown to protect the skeleton (Food and Nutrition Board, Institute of Medicine, 1997). Established osteoporosis is so commonly associated with malabsorption of calcium and/or high obligatory calcium excretion as to suggest that negative calcium balance has at least a contributory, if not a causal role in osteoporosis (Nordin, 1997). High dietary calcium or calcium supplementation in postmenopausal women improves Bone Mineral Density (BMD) and reduces bone loss and risk of fractures (Michaëlsson et al., 1997; Prince et al., 1995).

It is almost impossible to achieve adequate intake when dairy products are eliminated from the diet. Calcium supplements are needed for people who cannot consume enough calcium-rich foods (NIH Consensus Development Panel on Optimal Calcium Intakes, 1994). Many, but not all, studies have shown that calcium supplements cause a modest increase in bone mineral content (Heaney, 2000a).

According to the Croatian Osteoporosis Society and Institute of Public Health in Croatia 130 000 women have osteoporosis and 260 000 have osteopenia (Giljević, 2003; Tomek-Roksandić et al., 2003).

The aim of the study was to determine if calcium intake in patients with osteoporosis and osteopenia is influenced by a patient's knowledge about the disease.

Subjects and methods

A committee of the World Health Organization (WHO) has defined osteoporosis as Bone Mineral Density (BMD) more than 2.5 standard deviations below the mean value of peak bone mass in young normal women. Osteopenia is defined as BMD between 1 and 2.5 SD below the mean value of peak bone mass in healthy young women (World Health Organization, 1994).

Subjects were patients (n=197) from two hospitals in Zagreb who came on regular medical control. The average age was 62.9 ± 9.4 years (mean \pm SD) (Table 1). The results presented are collected from an ongoing survey on dietary and other behaviour in women with lower bone density (osteoporosis and osteopenia).

Table 1: Demographic characteristics of the subjects ($x \pm SD$)Tablica 1: Demografske karakteristike ispitanika ($x \pm SD$)

Parameters / Parametri	Subjects (n=197)
Age (years) / Dob (godine)	62.9 \pm 9.4
Body heights (cm) / Tjelesna visina (cm)	67.5 \pm 10.4
Body weight (kg) / Tjelesna masa (kg)	160.9 \pm 6.38
Height loss since youth (cm) / Gubitak visine u odnosu na mladost (cm)	2.6 \pm 2.45
Increase in body weight since youth (kg) / Porast tjelesne mase (kg)	11.8 \pm 8.73
BMI (kg/m ²) / Indeks mase tijela (BMI,(kg/m ²))	26.1 \pm 3.96
Age of menarche (years) / Dob menarhe (godine)	14.03 \pm 1.98
Age of menopause (years) / Starosna dob u menopauzi (godina)	48.6 \pm 4.80
Drinks at least one cup of coffee every day (% subjects) / Konzumira najmanje jednu šalicu kave na dan (% ispitanika)	62.7
Smokes/smoked (at least 5 cigarettes per day during last 10 years) (% subjects) / Pušači/puše najmanje 5 cigareta na dan tijekom prošlih 10 godina (% ispitanika)	22.1
Light to moderate physical activity (hours per week) / Slaba do umjereno jaka tjelesna aktivnost (sati na tjedan)	20.6 \pm 13.86

The dietary assessment method used was a specially designed completely quantified Food Frequency Questionnaire (Macdonald, 1991). This method was found to be useful in measuring intakes for a variety of nutrients (Pao and Cypel, 1990).

The reference period, for the Food Frequency Questionnaire, is one taken a year before. Patients were asked to recall how often they consumed certain foods. The minimal consumption frequency recorded was "once a month". Available consumption frequencies were "once a month", "2-3 times per month", "once a week", "2-3 times per week", "4-6 times per week", "once a day" and "twice or more per day." Photographs of foods in actual size were used to determine the quantity of food, where for every food, small, medium and large portions were shown (Hess, 1997). Dish and utensil models were used to determine portion size where needed. Records were converted to quantities by using internal compilation of food composition tables and/or data from food labels (Kaić-Rak and AntoniĆ, 1990).

Surveys were conducted in the form of personal interviews with trained interviewers in hospitals where patients came for regular physician's

examination. Responses to the questionnaire were both voluntary and confidential.

Additional questionnaire tested patients' knowledge about osteoporosis and provided demographic data and information on dietary and other behaviour (such as number of children, number of siblings, level of education, duration of lactation, level of physical activity). Family histories of osteoporosis were also collected (mother, sister or daughter) based on medical information about patients. Each lasted approximately 45 minutes.

The questionnaire for testing patients' knowledge about osteoporosis was created for this purpose and had six simply questions. As answer on three questions, with statement about calcium intake and correlation with osteoporosis and hypertension as well as statement that osteoporosis and arthritis are the same, patients could choose between the offered answers "Yes", "No" and "I do not know". On questions about calcium recommended daily intake for their age and gender and also which vitamin is important in calcium metabolism, patients should answer directly. The sixth question offered eight foods (orange, meat, milk and dairy, dark green vegetables, sardines, bread, nuts) and patient should recognise those rich on calcium.

Nutrient intakes were evaluated with regard to Dietary Reference Intake (DRI) which are revised Recommended Dietary Allowance (RDA) for some nutrients (Food and Nutrition Board, Institute of Medicine, 1997; The National Academy of Science, 1989). RDA has been in use in Croatia since 1994 (The Ministry Of Health, 1994). DRI of calcium for women, older than 50 years, is 1200 mg.

Results and discussion

Preventive measures including patient education can reduce fractures related to osteoporosis. The first step in preventing osteoporosis in women should be to make them aware of the risk factors. The aim of the study was to determine if calcium intake in patients with osteoporosis and osteopenia is influenced by patient's knowledge about the disease.

Results showed that amount of education did not significantly correlate with calcium intake.

On average a dietary calcium intake was 945.9 mg, i.e. 79.8% DRI (Table 2). A dietary calcium intake of above 100% DRI was observed in only 27.8% subjects. Calcium supplement use was reported by 60.2% subjects and 51.2% of the subjects use supplements on daily basis. When summered dietary

calcium and calcium from supplements in only 47.4% subjects calcium intake was more than 100% DRI. Some authors even recommend intakes of 1500 mg/day in elderly women with osteoporosis and osteopenia; DRI for women older than 50 years is 1200 mg/day (Hoover et al., 1996; Berg and Cassells, 1992). Only 32.0% of the subjects had a total calcium intake above 1500 mg (Table 2).

Table 2: Daily calcium intake

Tablica 2: Dnevni unos kalcija

Calcium intake / Unos kalcija	Dietary calcium / Kalcij iz hrane	Calcium supplements / Kalcij kao dodatak prehrani	Total calcium intake / Ukupni unos kalcija
mg (x ± SD)	945.9 ± 544.63	247.0 ± 334.56	1192.9 ± 630.19
% DRI (x ± SD)	79.8 ± 45.87	20.6 ± 27.88	100.9 ± 53.43
% subjects / % ispitanika			
<1200 mg	20.6		
1200-1500 mg	47.4		
> 1500 mg	32.0		

Table 3: Food recognised as good source of calcium

Tablica 3: Namirnice prepoznate kao dobar izvor kalcija

Parameters / Parametri	% subjects / % ispitanika
"Milk and dairy products are good source of calcium" / "Mlijeko i mliječni proizvodi su dobar izvor kalcija"	95.9
"Dark green vegetables are good source of calcium" / "Tamno zeleno povrće je dobar izvor kalcija"	37.1
"Sardines are good source of calcium" / "Sardine su dobar izvor kalcija"	57.8
"Nuts are good source of calcium" / "Orašasti plodovi su dobar izvor kalcija"	40.2
"Good sources of calcium include milk and dairy products, dark green vegetables, sardines and nuts" / "Dobri izvori kalcija su mlijeko i mliječni proizvodi, tamno zeleno povrće, sardine i orašasti plodovi"	12.4

It is very difficult to meet calcium needs without a source of milk in the diet and failure to meet calcium requirements in youth can impede the

achievement of maximal skeletal growth and bone mineralization, increasing the risk of developing osteoporosis later in life (Matkovic and Ilich, 1993). When asked in what period of life they consumed the highest quantity of milk and dairy products, the highest percent of subjects (27.8%) answered after the age of 50 years. In this case, although not significantly, the ages are negatively correlated with calcium intake. The period of time from diagnosis did not correlate with calcium intake.

Caffeine adversely affects calcium metabolism, decreasing absorption, but the effect is small and can be annulated by adding milk (Heaney, 2000 b). In this study 62.7 % subjects are regular coffee consumers, but most of them (89.0%) have coffee with milk (Table 1). Similar findings were reported in other studies (Kato et al., 2000).

Osteoporosis is a disease with a strong genetic component (Ralston, 2002). Osteoporosis cases in their families reported 23.1% subjects (Table 1). The number is probably larger since many cases go undiagnosed. No significant difference in calcium intake was observed when considered if osteoporosis was reported in family anamnesis.

On average, subjects that knew the recommended calcium intake had higher calcium intake (1369.6 mg) than those who did not (929.2 mg) and had significantly higher ($p = 0.01$) supplemental calcium intake than those without this knowledge. Calcium as an important nutrient in prevention of osteoporosis considered 94.8 % of the subjects (Table 4). In a similar study 85.7% of women identified low calcium intake as a risk factor for developing osteoporosis (Saw, 2003).

Significant correlation ($p < 0.01$) for calcium intake and the number of correct answers to questions about osteoporosis and on a food checklist on good calcium sources recognition was observed. In a similar study 36% of the respondents could correctly identify the calcium-rich foods among the choices (Ungan and Tumer, 2001). In this study 44.3% of the subjects correctly identified at least 3 of 4 good calcium sources among 9 listed foods and 95.9% of the subjects identified milk and dairy products as good calcium sources (Table 3).

When divided into subgroups according to knowledge about osteoporosis, the results showed higher daily calcium intakes in subjects who had more information about the disease, and also higher when compared with average calcium intake in all subjects (Tables 2 and 4).

Table 4: Daily calcium intake in subgroups of subjects divided according to knowledge about osteoporosis
 Tablica 4: Dnevni unos kalcija u podskupinama ispitanika podijeljenih prema saznanjima o osteoporozi

Patients' statements / Izjava pacijenta	% subjects / % ispitanika	Dietary calcium / Dijetalni kalcij	Calcium supplements / Dodatni kalcij	Total calcium intake / Ukupni unos kalcija
		% D R I (x ± S D)		
"Calcium is important in the prevention of osteoporosis" / "Kalcije je važan u prevenciji osteoporoze"	94.8	80.4 ± 45.51	21.5 ± 28.34	101.9 ± 52.05
"Calcium has a role in blood pressure regulation" / "Kalcij ima ulogu u regulaciji krvnog tlaka"	18.6	94.5 ± 41.64	11.7 ± 23.67	106.2 ± 42.71
"Vitamin D is important in calcium metabolism" / "Vitamin D je važan u metabolizmu kalcija"	57.7	81.5 ± 43.61	22.9 ± 27.88	104.4 ± 47.88
"I do not know which vitamin is important in calcium metabolism" / "Ne znam koji vitamin je značajan za metabolizam kalcija"	42.3	75.2 ± 48.02	16.8 ± 28.13	92.1 ± 58.02
"Recommended daily calcium intake for women older than 50 years is 1200 mg" / "Preporučeni dnevni unos kalcija za žene iznad 50 godina iznosi 1200 mg"	25.8	88.6 ± 51.17	30.0 ± 29.90	118.6 ± 53.83
"I do not know recommended daily calcium intake for women older than 50 years" / "Ne znam preporučeni dnevni unos kalcija za žene iznad 50 godina"	74.2	75.4 ± 43.07	17.0 ± 26.71	92.4 ± 50.64
"Osteoporosis and arthritis are not the same disease" / "Osteoporoza i artritis nisu ista bolest"	66.0	82.8 ± 46.44	22.4 ± 28.54	105.2 ± 48.96

Conclusion

Years of education did not correlate with calcium intake. Subjects that knew the recommended calcium intake in average had higher diet calcium and supplemental calcium intake than those who did not know the recommended calcium intake. The period of time from diagnosis did not correlated with calcium intake. Significant correlation was observed for calcium intake and number of correct answers to questions about osteoporosis.

This study showed that a patient's knowledge about osteoporosis is important in achieving adequate calcium intake.

This paper was presented on 9th European Nutrition Conference, Rome, Italy, October 1.- 4., 2003.

DA LI JE ZNANJE PACIJENTA O OSTEOPOROZI POVEZANO S UNOSOM KALCIJA?

Sažetak

Cilj ovog istraživanja bio je utvrditi da li je unos kalcija u pacijenata s osteoporozom i osteopenijom povezan sa znanjem o bolesti. Prikazani su dosad prikupljeni rezultati istraživanja o prehrambenim i drugim navikama u žena niske mineralne gustoće kosti.

Ispitanici su bile 197 žena prosječne dobi 62,9 godina. Upotrijebljen je posebno napravljen upitnik o učestalosti konzumiranja hrane i pića (FFQ), te dodatan upitnik za demografske podatke.

Na pitanje u kojem periodu života su konzumirali najveće količine mlijeka i mliječnih proizvoda, najveći postotak ispitanika (27,8%) je odgovorio nakon 50. godine života, ali utvrđena je negativna, iako ne i statistički značajna korelacija između dobi i unosa kalcija. Godine obrazovanja nisu statistički značajno korelirale s unosom kalcija. Ispitanici koji su znali koja je preporuka za unos kalcija su imali veći prosječan unos (1369,6 mg vs. 929,2 mg) i imali su statistički značajno veći unos kalcija dodatcima prehrani nego oni koji nisu znali preporuku ($p = 0,01$). Nije utvrđena značajna razlika unosa kalcija s obzirom na to da li u obitelji ima ili je bilo oboljelih od osteoporoze. Period koji je protekao od dijagnoze osteoporoze nije koreliralo s unosom kalcija. Statistički značajna korelacija ($p < 0,01$) je utvrđena za unos kalcija i broj

točnih odgovora na pitanja o osteoporozi i prepoznavanju dobrih izvora kalcija.

Ovo istraživanje je pokazalo da je znanje o osteoporozi u oboljelih značajno u postizanju adekvatnog unosa.

Ključne riječi: osteoporoza, upitnik o učestalosti konzumiranja hrane i pića (FFQ), kalcij, znanje o prehrani

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Adrese autora – Author's addresses:

Prof. dr. sc. Irena Colić Barić

Dipl. ing. Zvonimir Štalić

Laboratory for Food Chemistry and Nutrition, Faculty of Food Technology and Biotechnology, University of Zagreb, Zagreb, Croatia

Dr. sc. Zlatko Giljević

Division of Endocrinology, Department of Internal Medicine, Clinical Hospital Centre Zagreb, Zagreb, Croatia & Croatian Society for Osteoporosis

Dr. sc. Franjo Škreb

Department of nuclear medicine, University hospital Dubrava, Zagreb, Croatia

Mr. sc. Inga Koren-Kesner

Lura d.d., Food Industry, Zagreb, Croatia

Prispjelo – Received: April 02, 2004

Prihvaćeno – Accepted: May 06, 2004