

Analysis of frequency of selected food intake in the women of postmenopausal osteoporosis

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Summary

Introduction. Structure changes of the bone tissue connected with age and hormonal activity are also depended on other factors such as quality of consumed products including calcium. The main point of this study was an assessment of quantity and frequency of intake of this products in women with postmenopausal osteoporosis.

Objective. The aim of this study was an assessment of quantity and frequency of intake of the most important food affecting calcium metabolism in women with postmenopausal osteoporosis and first of all to give an answer to following research questions:

1. How is molding the level of intake of high-calcium products with reference to recommended norms in women with postmenopausal osteoporosis?
2. How was molded the intake of high-calcium products between 11 and 18 years of live?
3. How is molding the intake of products having essential influence on bone mass loss in analyzed groups?

Material. The research was carried out from October 2006 to March 2007. All the patients were qualified to the research group on the basis of densitometry examination of the spine. All patients are currently treated in osteoporosis clinics in Krakow. The subjects were group of 60 women, aged 49 to 91 (average age 69 years). Most of the patients (54 people) live in Krakow, the rest of the research group (6 persons) live in Myślenice and Wieliczka.

Method. The research were done using of specially structured questionnaire. Part one of the questionnaire constituted general questionnaire which contained personal details, questions about taking medicines, concomitant diseases and hormone metabolism. Part two (detailed questionnaire) consisted of 37 questions. Those questions were related to quantity and frequency of consumption of high calcium content food and in reverse there were some questions about products that can have harmful effects on calcium metabolism. Additionally the patients were asked about frequency and steadiness of using vitamins and mineral components. The last questions compared valuable products consumption with those products consumption at patients' young age.

Results. The average frequency of intake of milk and other products with high-calcium content was lower with reference to recommended norms in research group. There was relatively low average of intake of high-calcium products during childhood (11 - 18 years) in research group. Additionally there was observed the excessive consumption of coffee and tea resulted in the loss of bone weight.

Conclusions.

1. The intake of high-calcium products molds on lower level with reference to recommended norms in women with postmenopausal osteoporosis.
2. The intake of high-calcium products during childhood stays on low or medium level.
3. The consumption of products resulted in the loss of bone weight molds on excessive level.

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INTRODUCTION

Like in the case of other conditions of civilized societies osteoporosis prevention consists in healthy lifestyle, in which proper diet beside physical activity is of special importance. The basis of prevention of those diseases is reaching the highest possible bone mass in youth and decreasing to a minimum loss of it in mature age. Up to 25 % bone mass can be controlled, mainly by dietary intervention and that is why proper eating at each age allows to keep proper mineral density of bones. [1, 2] Dietary intervention can be split between primary one, which consists in maximizing peak bone mass since one's birth until the age of around 35 years and includes diet together with moderate physical exercise and secondary, which is conducted at postmenopausal and old age (while remarkable loss of bone mass is noticed) and is supplemented by pharmacological treatment in the form of calcium supplements and vitamin D.

Optimal and properly balanced diet should provide necessary nutritious and mineral elements. Basis of this is also sufficient supply of calcium and other elements and vitamins and particularly vitamins D₃, C, B₆, K. [3, 4]

THE AIM OF THE STUDY

The aim of that study was to assess the quantity and frequency of food intake that affects Ca²⁺ metabolism in women with postmenopausal osteoporosis and first of all to give an answer to following research questions:

1. How is molding the level of intake of high-calcium products with reference to recommended norms in women with postmenopausal osteoporosis?
2. How was molded the intake of high-calcium products between 11 and 18 years of live?
3. How is molding the intake of products having essential influence on bone mass loss in analyzed groups?

MATERIAL

The subjects of survey were 60 women aged 49 to 91 (average age was 69 years). The vast majority of patients, that is 54 came from Krakow, the other 6 lived in Wieliczka and Myślenice. Body mass ranged from 45 to 95 kg (average weight was 67 kg). Average height of those women was 151cm to 176 cm at age of 25 (average height was 161 cm), while average present height was 158 cm and it ranged from 146cm to 174 cm. All the patients were given a diagnose of osteoporosis by the physician and have received regular treatment in osteoporosis outpatient clinics in Krakow. (See Tab. 1)

The frequency of concomitant conditions that might have negative effect on calcium metabolism in bones was assessed in the group of subjects. In group of other conditions among others ischemic heart disease, hypertension or stroke occurred (See Tab.2)

For the mentioned above additional diseases the patients took different medications, such as steroids or thyroid hormones apart from osteoporosis medicines (See Tab.3)

In the survey group first menstruation occurred at the age of 14 years on average while menopause started on average at about 49 year. The majority, that is 29 women (48%) gave birth to two children, 12 (20%) gave birth to one child, seven (12%) had no children while 12 (20%) had three or more offsprings. None of questioned women used oral anticonception. 14 women (that is 24%) of the whole survey group underwent gynecological surgery.

METHOD

The survey was conducted from October 2006 to March 2007. The patients were qualified to the research group on the basis of osteoporosis diagnosed by a physician. All the patients are currently treated in osteoporosis outpatient clinics in Krakow. Specially constructed questionnaire was used for that survey. It consisted of two parts. Part one was a general questionnaire which included questions of personal information, questions about medicines taken, possible concomitant diseases and hormone metabolism. At the end each of the questioned women signed agreement in writing on publishing results of the survey.

Part two was a detailed questionnaire consisting of 37 questions. The questions referred to quantity and frequency of eating high calcium content food and the contrary - the questions about intake of food that negatively affect calcium metabolism. Next issues included questions of mineral supplements and vitamins intake.

Tab. 1. Medications taken by questioned patients due to diagnosed osteoporosis

MEDICATIONS	N	%
Calcium supplements	54	90
Vitamin D	42	70
Compounds of fluorine	14	23
Calcitonin	2	3
Female hormones	1	2
Bifosfonians	0	0

Tab. 2. Concomitant diseases

CONDITIONS	N	%
Thyroid conditions	13	22
Diabetics	9	14
Asthma	5	8
Rheumathis diseases	34	58
Long term immobility	11	17
Kidney diseases	1	2
Other	40	68

Tab. 3. Medications taken due to concomitant diseases

MEDICATIONS	N	%
Steroids	2	3
Thyroid hormonem	1	2
Duretic medications	5	8
Epilepsy medications	0	0
Other	12	20

The last question allowed to compare consumption of nutritious products now to consumption of them at young age of the patients.

The statistics analysis was executed by Excel spreadsheet and Statistica 7. packet. There was two modules accepted: cluster analysis and analysis of variance (ANOVA).

Tab. 4. Average consumption of selected products

PRODUCT	ARITHMETIC MEAN
How many tablespoons / a day?	
Powder milk	0,2
Whipped cream	0,5
Hard cheese in meals	0,7
Non-sweetened condensed milk	0,01
Sweetened condensed milk	0
How many portions / a day?	
Pudding	0,4
Pasta wiyh cottage cheese	0,7
How many glasses a day?	
Buttermilk	1,5
Fruit drinks	0,5
Milk	0,5
Milkshake	0,2
Kefir	0,9
How many slices / a day?	
Fromage	0,6
Soft cheese	1,5
Hard cheese	1,6
Hard cheese – a snack	0,3
Cottage cheese	2
Cottage cheese on bread	1,5
Quark	1,2
How many cartons / a day?	
Fruit yoghurt	0,6
Natura yoghurt	0,7
Soft cottage cheese	0,6
Quark	1,1
How many plater / a day?	
Milk soup	0,5
How many balls / a day?	
Ice cream	0,5
How many dices / a day?	
Diced cheese	0,2
How many pieces / a day?	
Cheese cake	1,4
How many pieces / a day?	
Cheese toasts	0,5
Pancakes with cheese	1,7
Potarto and cheese dumplings	2,4
Dumplings with cheese	4,6
Cheese biscuits	0,4
How many glasses / a day?	
Tea	2,6
Coffee	1,6

RESULTS

Descriptiional statistics

All listed in the questionnaire products were split in groups by the kind of volume of given food, for instance number of spoonfuls eaten, plates or cartons (See Tab. 4, Tab.5)

Statistical analysis

The group of 60 women with postmenopausal osteoporosis was questioned about frequency of intake of 36 food items, including 32 dairy food items (or dishes) and additionally fruit drinks, tea, coffee, vitamins or minerals. The frequency of that food intake was the data subjected to analysis. The answers to the questions of the questionnaire were obtained in 9 point Likert scale [5] from every day (1) to (8) once a month and (9) rarely/never. There were no refusals or lacks of answers in the survey group. Declared times of intake of given food were calculated into assessments of frequency of intake during one day (See Tab. 6)

From among 32 dairy products 6 sets of 2-5 products of similar correlation of their intake assessments during one day were separated in the questioned group of 60 people. Consequently, separated sets were treated as separate products intake frequency of them during one day was equal to sum of frequency of intake of separate products of the set (See Tab. 7)

In consequence 6 sets of products and 7 single products instead of initial 32 products were subject to further analysis. Four subgroups of people varying in frequency of intake have been separated in the survey group. Groups: (by means of cluster method; *by means of* K – the mean 5 people have different location) (See Tab. 8, Tab. 9, tab. 10) and groups by only extreme values (See Tab. 11).

Analysis of variance ANOVA confirmed significance of differences of the means of frequency among the individual groups. (See Tab. 12)

DISCUSSION

Osteoporosis as a condition of civilized societies has been identified as a serious medical problem to many populations. The frequency of incidence of osteoporosis is still rising what is related to longer life expectancy and deficiency of calcium and vitamin D in diet, more and more sedentary life style, decrease in physical activity and excessive consumption of coffee and alcohol. [6]

Recommended daily allowance of calcium for elderly people ranges from 500 to 1500 mg. [2, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]. On the basis of our findings we can state that average daily calcium intake in the surveyed group of patients, does not exceed 500 mg, like in questioned American women. [16]

The main sources of calcium are, according to Grajeta [4], Hasik [17], Wardyn [15] and Stanclik [2], are milk and other dairy products: kefirs and yoghurts in which for instance one glass of milk (250 ml) contains

300 mg Ca. [2] The generated from the questionnaire data allow to state that diet of aged between 11 and 18 patients did not lack milk but yogurts and kefir were nearly

not consumed by them. Following quantity and quality of dairy products intake in questioned individuals we can state that it is unfortunately very low (0,5 glass a day).

Tab. 5. Percentage comparison of present consumption of rich in calcium products with their consumption at the age of 11–18 in questioned patients

PRODUCT	Considerably more	Slightly more	The same	Slightly less	Considerably less
Milk	33%	28%	5%	8%	3%
Milk soup	27%	35%	2%	5%	32%
Yoghurt	3%	3%	5%	0	88%
Cottage/ hard cheese	20%	38%	8%	15%	18%

Tab. 6. Analysis of frequency of consumption into frequency of consumption 1/a day

rank	times of consumption	Frequency of consumption 1 / day
1	Every day	1
2	5x/a week	0,71
3	4x/ a week	0,57
4	3x/ a week	0,43
5	2x/ a week	0,29
6	1x/ a week	0,14
7	1x/2 weeks	0,07
8	1x/month	0,03
9	Rarely/never	0,01

Tab. 7. Sets of products

Ice cream # whipped cream # soft cheese		
With cheese # milkshakes		
yoghurts # kefir & buttermilk # pudding		
Hard cheese + a snack + diced cheese & hard cheese - a snack		
Soft chottage cheese	Soft cheese/quark	Soft cheese/quark – a carton
Wafers, biscuits# toasts		

Tab. 8. Analysis of selected groups

n	Group 1		Group 2	Group 3	Group 4	Beyond
1	1	37	13	11	3	5
2	2	39	19	15	6	
3	4	40	22	21	7	
4	9	41	28	36	8	
5	10	43	29	42	12	
6	14	45	30	44	16	
7	18	46	49	48	17	
8	20	47	54	58	23	
9	24	52			32	
10	25	53			33	
11	26	56			38	
12	27	59			50	
13	31	60			51	
14	34				55	
15	35				57	
	28		8	8	15	

Tab. 9. Analysis of frequency of consumption of products within groups

PRODUCT	group 1	group 2	group 3	group 4
Milk	C	A	C	C
Ice cream# whipped cream# soft cheese	C	A	C	C
With cheese# warm# milkshakes	D	B	B	B
yoghurts#kefir& buttermilk#pudding	D	D	A	B
Tea	A	D	A	A
Cottage cheese	B	B	B	A
quarks	B	B	B	A

Tab. 10. Legend to tabel nr 9

Legend	
More than the other groups	A
Average	B
3 groups less than the other groups	C
less than the other groups	D

Some women does not consume it at all and additionally only 8 % of women drinks whole milk which contains the highest amount of calcium (about 300 mg) and vitamin D. [17]

Other sources of calcium are cheese, dry milk powder and quark [8] because in 100 g of quark one can find 150 mg of Calcium and in 100 g of cheese – as much as 1300 mg of Ca. [2] Analysis of our findings shows that, like in Żuława [18] milk powder is used very rarely and in minimal quantities (about 0,2 of teaspoon per day). Yet cheese consumption in our survey group is much higher, because only 20% of 60 people group do not use cheese in their diet, questioned by Żuława women did not eat it at all. In both survey groups quark consumption was similar and declared by about 80 % of questioned individuals, which is a vital fact because quark is suggested to be an equivalent of meat for aged people due to its higher content of calcium while it significantly does not rise level of protein. [19]

From among available on the market yoghurts natural yoghurts are eaten definitely more often (70% of the group) compared with fruit yoghurts (47%), however it is amount of only about 0,5 carton per day that is eaten, like in Żuława [18].

According to Jacob [10] caffeine stimulates parathyroid to secrete parathyroid hormone, which stimulates osteoclast cells and thus speeds up osteoporosis. Chelmińska [19] suggests then reducing coffee intake to one cup of coffee per day. In the questioned group large amounts of caffeine-rich drinks have been noticed – as many as 77% individuals drinks 1,6 glass of coffee a day on average and 93% drinks 2,6 glasses of tea per day.

Amy Fitzimmons [20] announces that osteoporosis may occur in the course of other diseases or be a side effect of taking some medications. Long term taking steroids, as it takes place in treatment of asthma or medications to treat epilepsy may cause osteoporosis.

Our survey also proves the above statements because a significant percentage of questioned patients suffered from rheumatic diseases (58%), thyroid (22%), diabetics

(14%) and asthma and kidney diseases and 17% was immobile in their past. Respectively to their concomitant conditions the patients took the medications that could negatively effect calcium metabolism.

Suggested daily allowance of vitamin D for the aged population is about 800- 1000 IU. The easiest way of generating this vitamin is exposure to sunshine, however it has been noticed that in elderly people oral vitamin supplementation is more effective than sunbathing. [9] As the findings show, the questioned patients following the physicians' advice in nearly 90% supplement the missing elements by taking calcium and vitamin D supplements.

Analysis of the findings allows to state that quantity and frequency of the most important products effecting calcium metabolism in women with postmenopausal osteoporosis was insufficient in the questioned group. Old average age (69) of the questioned could affect the results of the survey, because one of dietary problem of aged population is excessive consumption of fats and carbohydrates while low consumption of vitamins and mineral elements. The excessive consumption of meat and its preserves and lower consumption offish, vegetables, fruit and dairy products. Many factors are conducive to malnutrition. One of them is loneliness that affects majority of the elderly. They do not care that much of what they eat, are reluctant to prepare meals just for themselves. Besides mobility difficulties cause problems with doing shopping and insufficient financial means do not allow to buy many nutritious products what leads to general aversion to food novelties. Additionally improper dietary habits and underestimating the aspects of balanced diet have been commonly observed.

CONCLUSIONS

1. In the survey group of women with osteoporosis relatively low average consumption of calcium - rich products in their childhood (11 to 18 years old) has been noticed, that might have effect on bone mineral density and thus on suffering from osteoporosis.

Tab. 11. Analysis of extreme frequencies of consumption of products within groups

PRODUCT	group 1	group 2	group 3	group 4
Milk		A		
Ice cream# whipped cream# soft cheese		A		
With cheese# warm# milkshakes	D			
yoghurts#kefir & buttermilk#pudding	D	D	A	
Tea		D		
Cottage cheese				A
quarks				A

Tab. 12. Collective table of multiple significance tests

Multiple significance test						
	Test	value	F	Effect	error	p
				df	df	
constant group	Wilks'	0,030438	95,56097	14	42,0000	0,00
	Wilks'	0,018472	8,47731	42	125,3575	0,00

2. In the survey group of women with osteoporosis low average frequency of dairy and rich in calcium products (against the recommended norms) and big amounts of caffeine drinks may have negative impact on mineral metabolism of bones.
3. In the survey group of women with osteoporosis observed dietary monotony (respectively higher consumption of individual groups of products and meals compared to the rest of them) does not allow supplementation of calcium by means of different products than milk or cottage cheese.

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