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PLACE OF RESIDENCE *VERSUS* CALCIUM AND DAIRY PRODUCTS INTAKE BY OLDER WOMEN IN A RETROSPECTIVE STUDY

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The aim of the work was to analyse differentiation of calcium and dairy products intake by older women in a retrospective analysis, taking into consideration place of residence. The study was carried out in two stages in years 1999 and 2004 among 192 women aged 75–80 living in the city, town and country. In the first stage, nutrition manner was evaluated, using the 24-h recall method. After 5 years data of the analysed women mortality was gathered. Differences in nutrients and dairy products intake were analysed between two groups: alive and dead women, taking into consideration place of residence. Our results give sufficient grounds for regarding older women living in towns of Olsztyn region as a group with an elevated risk of all-cause mortality. The analysis carried out separately for each place of living (city – town – country) showed no correlation between all-cause mortality and the intake of calcium and dairy products in the 5-year retrospective study. The revealed tendencies indicate the need of continuing studies with longer exposition to nutrition factors.

INTRODUCTION

The mean length of life has been increasing world-wide. In the year 2002 in Poland the mean life length amounted to 78.8 for women and compared to year 1991 it was longer by over 3 years. However, Poland still differs significantly from countries with the longest life expectancy. In Sweden in the year 1998 the mean life expectancy of women amounted to 81, and in Japan – to 83 [Statistical Yearbook, 2004; WHO, 1999]. The demographic changes are the cause of changes in specific diseases incidence frequency. The osteoporosis risk increases along with age. It is estimated that over 25% of women in Europe aged about 70 are affected by that disease. In Great Britain the annual treatment costs of thigh bone neck fracture alone amount to over 950 million pounds. Thus osteoporosis has become one of the main socio-economic problems for health care systems in aging societies [Prentice, 2002]. According to the World Health Organization osteoporosis is a general metabolic bone disease, characterised with low bone density, and thus their increasing fragility [WHO, 1994]. It is widely believed that osteoporosis needs broad prophylactic. Non-pharmacologic methods, including well-balanced diets along with physical activity, alcohol consumption limiting, non-smoking and avoiding falling down, are of major importance in the prevention of that disease [Marcinowska-Suchowierska, 2001; Horst-Sikorska & Marcinkowska, 2005; Prentice, 2002].

Studies on older people nutrition indicate that many nutrition errors occur [Cruz *et al.*, 1996; Słowińska & Wądołowska, 2004a, b]. They include *e.g.* a low intake of dairy products and resulting insufficient calcium intake, which, along with high phosphorus intake, has a negative impact on the Ca:P ratio. Usually, the calcium deficiencies resulting from nutrition are not revealed early enough, but often cause health problems in distant future [Suzuki *et al.*, 2003]. Thus there is a need to carry out longitudinal studies, including longer exposition for nutrition and non-nutrition factors, such as environment [Dołowa *et al.*, 2005; Amorim & Cruz *et al.*, 2002]. In the earlier study, it was revealed that most of the nutritional errors and worse nutrition state are found among older people living in towns, in comparison to people living in cities and in the country [Słowińska & Wądołowska, 2003]. It shows a need to carry out further studies including place of residence as an environmental factor.

The aim of the work was to analyse differences in calcium and dairy products intake by older women in a retrospective study, taking into consideration their place of residence.

MATERIALS AND METHODS

The study was carried out in two stages in the years 1999 and 2004. In the first stage, in the Population Record Bureau, with the Local Committee of Ethics agreement, there were 300 women born in years 1919–1924 (75–80 years old) drawn at random. They were living in the city – Olsztyn, towns: Barczewo and Biskupiec, and in the country located in Barczewo and Jeziorany communes. 192 women agreed to take part in the study (66 from city, 51 from town,

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75 from the country), which constituted 64.0% of the drawn population. Mean nutrients and groups of food products intake was estimated using the 24-h recall method [Gibson, 1990]. Interviews were carried out once with each analysed person on different week days, taking into consideration proportions between week days and weekend. During the study there were used specially prepared questionnaires and "Album of food products with different portion size" [Szczygłowa *et al.*, 1991]. To analyse the results obtained, use was made of the tables of nutritive values [Kunachowicz *et al.*, 1998]. The intakes of nutrients reported were decreased by technology and cooking losses amounting to: vitamin B_2 – 15%, vitamin A – 25%, and for other nutrients – 10%. Next, those values were compared to the recommended daily intake (RDI) [Ziemlański *et al.*, 1994]. Cholesterol and fibre intakes were compared to levels recommended by WHO [1990]: 300 mg for cholesterol and 27 g for fibre.

In the second stage, dates of death for women taking part in the study in the year 1999, who had died before the year 2004, were found in the Registry Office in Olsztyn. That allowed creating two groups of the women analysed: alive and dead. In the first group there were 145 women (54 from city, 31 from town, 60 from the country), that were alive in the year 2004, and in the second group there were 47 women (12 from city, 20 from town, 15 from the country) who died.

Differences in the intakes of nutrients and dairy products estimated in the first stage of the study were analysed between groups of alive/dead women created in the second stage, taking place of residence into consideration. Results were displayed as median (Me), quartile deviation (QD), 10^{th} and 90^{th} percentile. The statistical analysis of results was carried out using the StatSoft's Statistica v.7.0 PL software, at a significance level of $p \leq 0.05$, using the Kruskal-Wallis test.

RESULTS AND DISCUSSION

The comparison of older women mortality percentage revealed significant differences related to the place of residence. Twice as many deaths were stated among women from towns than among women from the city and the country (39.2% *vs*. 18.2% and 20.0%, respectively; Table 1).

The comparison of daily diet nutritive value and dairy

TABLE 1. Number of deaths of the analysed women depending on the place of living.

Environment	Total number	All-cause mortality after 5 years	
		Deaths number	Deaths percentage (%)
City	66	12	18.2[a]
Town	51	20	39.2[a,b]
Country	75	15	20.0[b]
Total	192	47	24.5

a–a, b–b – differences significant at $p<0.05$ in pairs

TABLE 2. Meeting RDI (%) and energy and nutrients content in daily diet of the analysed older women population.

Analysed parameter		Meeting RDI (%)				Nutrients intake			
		Total N=192	Women		p	Total N=192	Women		p
			alive N=145	dead N=47			alive N=145	dead N=47	
Energy (kcal)	Me±QD	81.9±19.0	82.4±18.7	77.2±19.4	NS	1360.9±323.6	1392.2±305	1285.4±344.6	NS
	p10–p90					735.3–2093.8	735.3–2093.8	519.4–2179.4	
Total protein (g)	Me±QD	99.5±31.5	99.6±29.8	96.9±42.2	NS	45.4±15.3	45.6±14.8	43.6±18.0	NS
	p10–p90					21.6–75.8	22.9–74.7	10.6–86.5	
Fat (g)	Me±QD	100.5±34.4	104.0±30.2	91.0±42.6	NS	45.6±15.1	48.1±14.4	43.0±18.4	NS
	p10–p90					22.3–82.1	23.5–82.0	14.4–96.7	
Cholesterol (mg)	Me±QD	59.7±38.1	62.8±37.6	51.2±39.4	NS	179.1±114.4	188.3±112.8	153.7±118.2	NS
	p10–p90					60.4–566.0	62.8–545.8	14.6–634.8	
Carbohydrates (g)	Me±QD	74.2±19.1	74.1±20.0	74.5±16.2	NS	195.2±48.5	198.4±49.8	190.9±45.8	NS
	p10–p90					97.3–304.2	96.8–303	97.3–334.4	
Fibre (g)	Me±QD	45.5±13.6	46.0±13.5	43.9±15.1	NS	12.3±3.7	12.4±3.6	11.8±4.1	NS
	p10–p90					6.9–19.9	6.6–19.9	7.3–20.3	
Vitamin A (ug)	Me±QD	69.5±34.4	64.9±31.7	76.7±47.0	NS	416.8±207.1	389.7±195.4	460.5±282.2	NS
	p10–p90					151.5–956	153.2–874.1	113.9–1637.2	
Vitamin B_2 (mg)	Me±QD	54.1±19.1	54.6±17.5	49.6±26.8	NS	0.97±0.34	0.98±0.31	0.89±0.48	NS
	p10–p90					0.36–1.74	0.36–1.68	0.24–2.09	
Calcium (mg)	Me±QD	37.0±21.0	37.6±20.6	33.9±23.2	NS	370.1±206.7	376±201.4	338.9±231.7	NS
	p10–p90					111.1–785.7	111.7–784.6	85.1–937.4	
Magnesium (mg)	Me±QD	63.0±19.0	62.5±18.7	63.5±20.9	NS	176.3±53.6	175±53.2	177.8±58.4	NS
	p10–p90					88.6–270.9	88.6–274.7	86.0–265.7	
Phosphorus (mg)	Me±QD	100.9±32.3	101.6±31.0	94.0±42.9	NS	756.4±242.3	761.7±232.5	705.2±321.5	NS
	p10–p90					318.1–1292.9	359.6–1262.6	249.2–1527.4	
Calcium to phosphorus ratio	Me±QD					0.49±0.15	0.5±0.17	0.44±0.14	NS
	p10–p90					0.24–0.79	0.23–0.81	0.29–0.72	

Me – median, QD – quarter deviation, p10, p90 – percentiles

TABLE 3. Meeting RDI (%) and energy and nutrients content in daily diet of the analysed older women living in a city.

Analysed parameter		Meeting RDI (%)				Nutrients intake			
		Total N=66	Women		p	Total N=66	Women		p
			alive N=54	dead N=12			alive N=54	dead N=12	
Energy (kcal)	Me±QD	82.6±114.6	82.9±18.0	78.9±17.4	NS	1404.7±320.3	1408.9±306.7	1353.1±336.4	NS
	p10–p90					707.7–1978.1	718.4–1962.5	448–2229.2	
Total protein (g)	Me±QD	108.0±148.7	108.0±24.9	103.6±50.1	NS	51.8±15.2	51.7±13.7	52.5±25.7	NS
	p10–p90					26.3–75.8	28.5–73.8	10.3–93.0	
Fat (g)	Me±QD	95.3±148.1	95.3±26.9	90±31.1	NS	44.4±14.1	44.4±14.1	42.1±15.8	NS
	p10–p90					22.3–67.9	23.4–67.9	8.5–63.9	
Cholesterol (mg)	Me±QD	50.5±152.4	49.0±33.4	51.9±44.1	NS	151.6±111.5	147±100.1	155.7±132.2	NS
	p10–p90					57.6–457.1	68.9–447.6	7–674.3	
Carbohydrates (g)	Me±QD	77.5±112.8	77.5±19.0	79.1±11.5	NS	207.4±51.4	207.4±52.1	210.7±33.4	NS
	p10–p90					98.7–311	111.7–303	89.0–355.3	
Fibre (g)	Me±QD	52.3±79.1	53.9±16.2	50.5±20.8	NS	14.1±4.6	14.5±4.4	13.6±5.6	NS
	p10–p90					5.8–21.4	5.8–20.6	7.3–25.9	
Vitamin A (ug)	Me±QD	53.4±204.8	53.4±37.3	58.8±99.1	NS	320.2±230	320.2±223.6	352.5±594.8	NS
	p10–p90					135.9–1229.1	145.2–817.7	5.8–1494.9	
Vitamin B_2 (mg)	Me±QD	60.4±96.2	60.4±13.5	59.2±35.9	NS	1.09±0.34	1.09±0.24	1.07±0.65	NS
	p10–p90					0.36–1.73	0.54–1.61	0.17–2.04	
Calcium (mg)	Me±QD	39.6±82.3	41.6±18.0	27.4±24.6	NS	395.7±197.8	416.1±179.6	274.1±245.9	NS
	p10–p90					112.2–823.2	138.3–784.6	58.3–823.2	
Magnesium (mg)	Me±QD	70.6±99.5	70.6±16.0	69.2±28.0	NS	197.6±52.4	197.6±44.7	193.8±78.5	NS
	p10–p90					99.3–278.7	104.5–278.7	62.1–266.5	
Phosphorus (mg)	Me±QD	119.6±169.0	119.6±18.8	114.6±54.8	NS	896.8±236.1	896.8±141.1	859.7±410.7	NS
	p10–p90					393–1267.3	484.5–1262.6	155.1–1424.2	
Calcium to phosphorus ratio	Me±QD					0.46±0.19	0.51±0.19	0.38±0.14	NS
	p10–p90					0.23–0.77	0.23–0.79	0.29–0.7	

Me – median, QD – quarter deviation, p10, p90 – percentiles

TABLE 4. Meeting RDI (%) and energy and nutrients content in daily diet of the analysed older women living in a town.

Analysed parameter		Meeting RDI (%)				Nutrients intake			
		Total N=51	Women		p	Total N=51	Women		p
			alive N=31	dead N=20			alive N=31	dead N=20	
Energy (kcal)	Me±QD	79.0±16.8	79.5±14.2	74.2±18.5	NS	1297.9±254.7	1342.3±250.1	1224.0±312.0	NS
	p10–p90					601.2–1783.5	638.6–1677.1	508.8–1924.4	
Total protein (g)	Me±QD	91.2±31.4	89.2±22.7	94±35.2	NS	45.0±12.3	45±11.4	44.2±13.7	NS
	p10–p90					15.8–73.9	22.0–73.7	12.4–82.6	
Fat (g)	Me±QD	91.8±28.5	103.0±26.7	89.2±42.0	NS	44.7±13.6	50.0±12.1	41.5±17.8	NS
	p10–p90					17.5–82.1	21.7–82.0	14.7–98.4	
Cholesterol (mg)	Me±QD	61.8±30.1	63.2±27.2	56.4±34.3	NS	185.5±90.3	189.6±81.7	169.1±103.0	NS
	p10–p90					62.8–545.8	62.8–545.8	48.5–536.6	
Carbohydrates (g)	Me±QD	64.2±15.7	66.0±12.1	61.1±16.2	NS	173.8±44.4	173.8±37.3	175.8±41.1	NS
	p10–p90					93.7–234.0	90.2–234.0	97.2–231.1	
Fibre (g)	Me±QD	40.7±13.3	40.7±12.7	40.8±14.2	NS	11.0±3.6	11.0±3.4	11.0±3.8	NS
	p10–p90					7.3–18.8	7.3–18.6	7.2–18.8	
Vitamin A (ug)	Me±QD	72.9±41.1	70.7±22.7	74.6±50.9	NS	437.3±246.5	423.9±153.8	447.6±305.4	NS
	p10–p90					162.6–1637.2	240.9–893.6	98.9–9685.1	
Vitamin B_2 (mg)	Me±QD	57.7±18.7	55.4±18.5	58.5±20.5	NS	1.04±0.34	1.00±0.33	1.05±0.37	NS
	p10–p90					0.42–1.68	0.42–1.4	0.37–3.47	
Calcium (mg)	Me±QD	34.3±22.4	30.6±20.6	35.2±24.6	NS	342.8±213.9	306.0±206.0	352.2±246.4	NS
	p10–p90					104.5–688.6	111.1–671.9	77.9–842.1	
Magnesium (mg)	Me±QD	57.6±11.5	55.5±11.2	59.3±13.8	NS	161.2±38.4	155.4±32.3	166.0±38.7	NS
	p10–p90					91.6–255.2	98.4–247.3	73.9–255.7	
Phosphorus (mg)	Me±QD	96.1±34.2	94.9±30.9	99.3±42.9	NS	720.8±256.2	711.6±231.4	744.6±321.6	NS
	p10–p90					318.1–1241.8	360.4–1093.1	232.2–1410.1	
Calcium to phosphorus ratio	Me±QD					0.52±0.14	0.52±0.17	0.5±0.12	NS
	p10–p90					0.23–0.79	0.18–0.82	0.29–0.75	

Me – median, QD – quarter deviation, p10, p90 – percentiles

TABLE 5. Meeting RDI (%) and energy and nutrients content in daily diet of the analysed older women living in the country.

Analysed parameter		Meeting RDI (%)				Nutrients intake			
		Total N=75	Women		p	Total N=75	Women		p
			alive N=60	dead N=15			alive N=60	dead N=15	
Energy (kcal)	Me±QD	90.0±24.9	91.6±26.2	77.9±26.3	NS	1481.0±3994.4	1285.4±474.9	1402.5±399.7	NS
	p10–p90					796.6–2468.5	905.3–2209.2	863.8–2385.9	
Total protein (g)	Me±QD	92.7±30.4	92.0±30.4	102.3±42.9	NS	40.8±15.2	43.1±11.6	42.0±13.1	NS
	p10–p90					20.8–88.5	21.6–85.9	21.5–85.9	
Fat (g)	Me±QD	104.8±41.2	112.8±37.6	97.1±41.8	NS	51.7±17.3	44.5±18.1	48.0±19.0	NS
	p10–p90					23.6–98.3	24.0–82.7	24.0–91.0	
Cholesterol (mg)	Me±QD	69.6±48.0	71.9±47.1	41.6±59.1	NS	215.6±141.4	124.8±177.3	208.8±144.1	NS
	p10–p90					60.7–641.4	9.2–583.8	60.7–633.5	
Carbohydrates (g)	Me±QD	79.5±26.2	81.1±27.4	77.7±26.5	NS	209.3±70.1	198.2±72.1	206.0±67.1	NS
	p10–p90					104.7–379.3	155.9–341.5	119.2–355.4	
Fibre (g)	Me±QD	43.3±12.6	43.3±13.1	42.3±12.3	NS	11.7±3.5	11.4±3.3	11.7±3.4	NS
	p10–p90					6.4–20.4	7.9–19.9	7.1–19.9	
Vitamin A (ug)	Me±QD	81.0±31.4	75.1±33.4	88.5±29.6	NS	450.6±200.6	531.0±177.5	485.7±188.5	NS
	p10–p90					153.2–800.4	162.1–765.0	162.1–765.0	
Vitamin B_2 (mg)	Me±QD	48.2±19.2	48.2±22.4	48.2±15.8	NS	0.87±0.40	0.87±0.29	0.87±0.35	NS
	p10–p90					0.30–1.74	0.32–2.09	0.32–1.78	
Calcium (mg)	Me±QD	31.7±19.9	32.6±22.7	30±16.6	NS	325.7±227.2	300.1±165.5	317.5±199.3	NS
	p10–p90					103.4–817.2	123.2–1013.0	111.7–817.2	
Magnesium (mg)	Me±QD	59.6±19.9	58.8±20.9	64±12.8	NS	164.7±58.6	179.1±35.7	167±55.7	NS
	p10–p90					79.4–277.1	92.3–248.5	83.3–274.7	
Phosphorus (mg)	Me±QD	91.8±27.6	94.9±34.2	85.8±20.1	NS	711.7±256.5	643.2±151.0	688.6±207.3	NS
	p10–p90					270.0–1340.8	290.5–1550.3	290.5–1340.8	
Calcium to phosphorus ratio	Me±QD					0.5±0.1	0.5±0.1	0.5±0.1	NS
	p10–p90					0.3–0.8	0.3–0.8	0.3–0.8	

Me – median, QD – quarter deviation, p10, p90 – percentiles

products intake in all three places of residence (city – town – country) did not show any significant differences between the groups of women alive and dead (Table 2–6). Energy intake (displayed as median) was low and amounted to 1361 kcal, which fulfilled 81.9% of the recommended daily intake (Table 2). Protein (99.5% of the RDI) and fat (100.5% of the RDI) intake medians may be concerned as proper, while that of carbohydrates – as too low (74.2% of the RDI). The cholesterol intake amounted to 179 mg and was compatible with the prevention recommendations. A low fibre intake, amounting to only 45.5% of the recommended level, was associated with low intakes of vitamins and other nutrients. The vitamin A intake median amounted to 70% of the RDI, and that of vitamin B_2 – to 50% of the RDI. Daily diet of the analysed women was characterised by very low contents of calcium (37% of the RDI) and magnesium (63% of the RDI). This may be particularly unbeneficial because of quite high phosphorus content (101% of the RDI).

Our previous studies among older people from the Olsztyn region revealed low energy and nutritive value of their daily diet [Słowińska & Wądołowska 2004a]. Three different nutrition models were separated in that study, *i.e.* "low nutritive", "dairy" and "meat-vegetable-fruit". Despite some health-promoting elements in the two latter groups, none of the models agreed with recommendations for that subpopulation. For over 4/5 of the analysed older people, regardless of sex and place of living, too low calcium intake was revealed, which was connected with a too low intake of dairy products [Słowińska & Wądołowska 2004b]. Dairy products are a recognised source of easily absorbed calcium. For example among youth it was revealed that dairy products provide about 75% of consumed calcium, and their main source were milk, hard cheese and yoghurts [Wądołowska *et al.*, 2002]. In the present work, the total dairy products intake median amounted to 349.6 g, as milk (Table 6). Milk intake varied from 0 g to 520 g for 10^{th} percentile and 90^{th} percentile, respectively. Fresh cheese content in women's diet varied from 0 g (10^{th} percentile) to 90 g (90^{th} percentile), and hard cheese content – from 0 g (10^{th} percentile) to 30 g (90^{th} percentile).

It should be underlined that nutrition factors are very important in osteoporosis etiology. It is also hard to state unambiguously the nutritive value of daily diet that would protect people against bone density losses in older age. A number of investigations have given clear-cut proofs for benefits coming from a well-balanced diet [Suzuki *et al.*, 2003; Moreiras *et al.*, 1996]. The Framingham Osteoporosis Study revealed a correlation between dietary patterns and bone mineral density. Higher bone mineral density of older people was correlated with a good-quality diet with a high intake of fruit, vegetables, and breakfast cereals and limited in less nutrient-dense foods [Tucker *et al.*, 2002]. Protective cross-sectional relationships between vegetables and fruit intake and bone mineral density were linked with magnesium and potassium content, and longitudinal protective effect was suggested [Tucker *et al.*, 1999]. In both studies those correlations were stronger for men than for women. It

TABLE 6. Milk and dairy products intake in daily diet of the analysed older women depending on the place of residence.

Analysed parameter		Total	Women		p
			alive	dead	
Total		N=192	N=145	N=47	
Total dairy products (g)	Me±QD	349.6±300.0	338.5±300.0	400.0±391.8	NS
	p10–p90	0.0–1033.6	0.0–950.1	0.0–1317.2	
Milk (g)	Me±QD	91.0±150.0	101.0±175.0	90.0±135.0	NS
	p10–p90	0.0–520.0	0.0–520.0	0.0–530.0	
Fresh cheese (g)	Me±QD	0.0±20.0	0.0±15.0	0.0±30.0	NS
	p10–p90	0.0–90.0	0.0–80.0	0.0–160.0	
Hard cheese (g)	Me±QD	0.0±0.0	0.0±0.0	0.0±0.0	NS
	p10–p90	0.0–30.0	0.0–30.0	0.0–40.0	
City		N=66	N=54	N=12	
Total dairy products (g)	Me±QD	416.0±275.0	437.5±241.0	311.8±412.6	NS
	p10–p90	0.0–1082.5	0.0–970.2	0.0–1082.5	
Milk (g)	Me±QD	150.0±185.0	195.6±187.5	0.0±125.0	NS
	p10–p90	0.0–525.0	0.0–520.0	0.0–563.6	
Fresh cheese (g)	Me±QD	10.0±30.0	10.0±25.0	15.0±32.5	NS
	p10–p90	0.0–100.0	0.0–100.0	0.0–120.0	
Hard cheese (g)	Me±QD	0.0±0.0	0.0±0.0	0.0±0.0	NS
	p10–p90	0.0–20.0	0.0–20.0	0.0–20.0	
Town		N=51	N=31	N=20	
Total dairy products (g)	Me±QD	250.0±226.7	440.9±348.5	299.8±251.7	NS
	p10–p90	0.0–800.0	0.0–960.0	0.0–870.0	
Milk (g)	Me±QD	85.5±135.0	144.0±130.0	85.5±130.0	NS
	p10–p90	0.0–500.0	0.0–475.0	0.0–500.0	
Fresh cheese (g)	Me±QD	0.0±2.0	0.0±16.2	0.0±10.0	NS
	p10–p90	0.0–75.0	0.0–70.0	0.0–75.0	
Hard cheese (g)	Me±QD	0.0±0.0	0.0±0.0	0.0±0.0	NS
	p10–p90	0.0–0.0	0.0–50.0	0.0–20.0	
Country		N=75	N=60	N=15	
Total dair products (g)	Me±QD	263.3±281.3	300.0±533.6	276.5±300.0	NS
	p10–p90	0.0–966.0	0.0–1497.0	0.0–1066.0	
Milk (g)	Me±QD	46.3±144.1	200.0±200.0	50.0±150.0	NS
	p10–p90	0.0–600.0	0.0–530.0	0.0–600.0	
Fresh cheese (g)	Me±QD	0.0±0.0	0.0±50.0	0.0±0.0	NS
	p10–p90	44.7–44.7	0.0–175.0	0.0–100.0	
Hard cheese (g)	Me±QD	0.0±0.0	0.0±0.0	0.0±0.0	NS
	p10–p90	40.0–40.0	0.0–30.0	0.0–40.0	

Me – median, QD – quarter deviation, p10, p90 – percentiles

strengthens the view on the significant role of vegetables and fruit and dairy products in osteoporosis prophylactics. However, many questions still need explanations for better understanding of the relation between nutrition and "healthy" bones in older age, particularly in relation to mortality [Prentice, 2002; Vellas *et al.*, 1997; Bates *et al.*, 1999].

It has been proved that an unbalanced, nutrient-poor diet is related to higher morbidity and mortality [Kant *et al.*, 2000]. The highest quartile of recommended food score was found to have the all-cause mortality risk lower for over 30% ($p<0.001$ for trend) and stroke risk lower for over 40% ($p<0.02$ for trend) than in the lowest quartile. Low-fat dairy products, vegetables and fruit, lean meat/poultry and whole grain products were conducive to longevity [Kant *et al.*, 2004]. Similar tendency may be observed in the presented study. As it results from earlier analysis carried out for the same subpopulation, the diet of women living in towns was characterised with the lowest nutritive value in comparison to diets of women living in the city and country [Słowińska & Wądołowska 2003, 2004a, b]. In the present study, women living in towns were also noted to have the highest mortality rate. It shows that there are differences in all-cause mortality of older women correlated with place of living, and probably with nutrition, and that older women living in towns of the Olsztyn region are the risk group.

No differentiation in all-cause mortality of older women, connected with the intakes of nutrients and dairy products studied, was stated within subgroups of place of living (city – town – country). However, the results do not contradict the occurrence of such relations. In the studies carried out by Roszkowski's research group [Dołowa *et al.*, 2005] on the longevity of women from the Warsaw region there were no significant correlations between nutrition and mortality stated after 4.5 years of observations. However, they were noted in the next research, after 9.5 years. The study revealed that the probability of death was significantly lower among women consuming smaller amounts of energy, total protein, fat, carbohydrates and fibre. It suggests that there is a possibility to find similar correlations in a further retrospective study on women from the Olsztyn region. The results obtained in this study and our earlier analysis on the same subpopulation [Słowińska & Wądołowska 2003, 2004a, b] show that higher all-cause mortality may affect older women living in towns of the Olsztyn region.

CONCLUSION

Our results give sufficient grounds for regarding older women living in towns of the Olsztyn region as a group with a higher risk of all-cause mortality. The analysis carried out separately for each place of living (city – town – country) showed no correlation between all-cause mortality and the intake of calcium and dairy products in a 5-year retrospective study. The revealed tendencies indicate the need of carrying out further studies with longer exposition to nutrition factors.

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MIEJSCE ZAMIESZKANIA A SPOŻYCIE WAPNIA I PRODUKTÓW MLECZNYCH PRZEZ KOBIETY W WIEKU PODESZŁYM W BADANIACH RETROSPEKTYWNYCH

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Celem przeprowadzonych badań była analiza zróżnicowania spożycia wapnia i produktów mlecznych przez kobiety w wieku podeszłym w badaniach retrospektywnych, z uwzględnieniem miejsca zamieszkania.

Badania zostały przeprowadzone w dwóch etapach w 1999 roku i 2004 roku wśród 192 kobiet w wieku 75–80 lat pochodzących z miasta, miasteczek i wsi. W pierwszym etapie oceniono sposób żywienia metodą wywiadu 24-godzinnego. Po 5-ciu latach zebrano dane o zgonach badanych kobiet (tab. 1). Zróżnicowanie spożycia składników pokarmowych i produktów mlecznych analizowano pomiędzy dwiema grupami kobiet: żyjących i nieżyjących, z uwzględnieniem miejsca zamieszkania (tab. 2–6).

Całodzienne racje pokarmowe kobiet ogółem mieszkających w mieście, miasteczku lub na wsi miały zbliżoną wartość odżywczą ($p>0,05$) bez względu na przeżywalność (tab. 2–5). Wykazano niskie spożycie energii, węglowodanów, błonnika pokarmowego, witamin i składników mineralnych, w tym wapnia (37% normy), za wyjątkiem fosforu (101% normy) oraz prawidłowe spożycie białka i tłuszczu. Spożycie produktów mlecznych ogółem, wynosiło 349,6 g w przeliczeniu na mleko (tab. 6).

Nasze wyniki dają mocną podstawę do uznania kobiet w wieku podeszłym mieszkających w małych miastach regionu olsztyńskiego za grupę ryzyka o zwiększonej śmiertelności ogólnej. Analiza prowadzona oddzielnie w każdym z trzech miejsc zamieszkania (miasto – miasteczko – wieś) nie wykazała zależności pomiędzy śmiertelnością ogólną a spożyciem wapnia i produktów mlecznych w pięcioletnich badaniach retrospektywnych. Zarysowane tendencje wskazują na potrzebę prowadzenia dalszych badań o dłuższym okresie ekspozycji na czynniki żywieniowe.