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NUTRITION AND BONE HEALTH AMONG POSTMENOPAUSAL LATVIAN WOMEN

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*The aim of this study was to assess the impact of yoghurt consumption on bone health among postmenopausal Latvian women. In the study, 52 participants were divided into two groups — control (n = 26) and experimental group (n = 26). Both study groups were able to consume a self-selected diet, but the experimental group had to additionally consume 175 g of plain organic milk yoghurt on a daily basis for eight weeks. 72-hour food diaries were obtained prior to and after the eight-week experiment. To evaluate bone mass density, a dual-energy X-ray absorptiometry (DEXA) was performed prior to the eight-week experiment. 25-OH-Vitamin D and calcium blood serum levels were evaluated prior to and after the eight-week experiment. DEXA revealed osteoporotic values at the lumbar spine or femoral neck region for ten participants. The 25-OH-Vitamin D blood serum level among the participants was sufficient (30.0–44.9 ng·ml^{-1}). Calcium blood serum levels were within reference values (2.1–2.6 mmol·l^{-1}) for all participants. No significant difference was found regarding yogurt consumption and calcium blood serum levels (*p = *0.400). Although the majority of participants noted milk and milk product consumption on a daily basis, the daily calcium intake only reached the lowest recommended value for adults (800 mg). Vitamin D intake from food and dietary supplements significantly varied (0 to 302.08 μg a day). For the prevention of osteoporosis, it is necessary to promote the consumption of fermented milk products and vitamin D supplementation among postmenopausal women.*

Keywords: *yoghurt, calcium, vitamin D, osteoporosis, postmenopausal period.*

INTRODUCTION

Osteoporosis is a skeletal disease characterised by low bone mass and microarchitectural deterioration of bone tissue, leading to bone fragility and increased fracture risk (LOKMSA, 2011). Although age-related bone loss affects both men and women, osteoporosis is more common for elderly women due to changes in bone resorption at menopause (Ong *et al.*, 2020).

Several factors (low body mass index, previous fractures, glucocorticoid treatment, current smoking, alcohol intake, etc.) contribute significantly to osteoporosis and fracture risk among women, as well as nutrition, especially calcium, vitamin D and protein intake (Kanis *et al.*, 2019; Matía-Martín *et al.*, 2019).

Adequate calcium intake is one of the cornerstones of osteoporosis prevention and treatment (LOKMSA, 2011; Rizzoli *et al.*, 2014; Tai *et al.*, 2015). Latvian national dietary guidelines recommend that calcium intake for adults should reach 800 mg per day (VM, 2017).

Although studies show that for postmenopausal women intake of calcium via dietary supplements increases bone mass density by ~1.6%, there is no evidence of the beneficial effects of its use on the risk of fractures (Shea *et al*., 2002). Therefore, food should be the main source of calcium and dietary supplements are recommended only if it is not possible to achieve a daily intake of calcium via food (LOKMSA, 2011).

Although calcium can be found in many products, milk and milk products are the most important sources of calcium in the diet, and two to three portions of milk and milk products should be included in the everyday diet (Ong *et al.*, 2020; VM, 2020). Milk and milk products provide more calcium per calorie than any other food (Rizzoli *et al.*, 2014). Around 250 mg of calcium can be obtained from a glass (200 ml) of milk, 190 g of yoghurt or 30 g of hard cheese (Rizzoli *et al.*, 2014).

Studies indicate that particularly fermented milk products may have beneficial effects on bone health (Ong *et al.*, 2020). Yoghurt consumption is associated with a reduction in the risk of fractures in postmenopausal women when compared with low or no yoghurt intake (Ong *et al.*, 2020; Matía-Martín *et al.*, 2019). Therefore, milk and milk products, especially fermented milk products should be consumed on a daily basis (VM, 2020).

To prevent the development of osteoporosis, it is important also to ensure an optimal blood serum level of 25-OH-Vitamin D (LOKMSA, 2011). To ensure optimal bone health, blood serum levels of 25-OH-Vitamin D should be above 30 $ng \cdot ml^{-1}$ and additional D vitamin intake via supplements is recommended, especially for postmenopausal women (LOKMSA, 2011; Kopiczko, 2020).

A previous survey of 25-OH-Vitamin D status among healthy Latvian women showed that the highest proportion of vitamin D deficient individuals was found in the study group representing the postmenopausal women (average 25-OH-Vitamin D blood serum level 18.7 $ng \cdot ml^{-1}$ in winter and 26.5 $ng \cdot ml^{-1}$ in summer) (Lejnieks *et al.*, 2013).

An adequate supply of dietary protein is also important for healthy bone maintenance (Rizzoli, 2014). Daily protein intake should be 0.8 to 1 g per kg of weight or approximately 10 to 20% of total energy intake (LOKMSA, 2011; VM, 2017). In the case of osteoporosis, daily protein intake ≥ 0.8 g per kg body weight is associated with a higher bone mass density (Rizzoli *et al.*, 2014). European guidance for the management of osteoporosis in postmenopausal women (Kanis *et al.*, 2019) also recommends sufficient dietary protein intake as an important factor for the prevention of osteoporosis for women over 50 years, preferably achieved through milk products. Previous data showed that the protein intake among Latvian women (50 to 64 years old) was optimal — around 77 g or ~18% of total energy intake (VM, BIOR, 2020).

Mean calcium intake across European countries ranges from ~600 mg per day in Bulgaria to 800 mg per day in France, Spain, Italy and 900 mg per day in Portugal (Rizzoli *et al.*, 2014). The average reported calcium intake among women (50 to 64 years old) in Latvia is lower than recommended 800 mg per day, reaching only around 680 mg per day (VM, BIOR, 2020).

Osteoporosis prevalence in Latvia among the female population aged ≥ 50 is approximately 22% or ~ 111 000 women (Kanis *et al.*, 2013). Previous studies in Latvia on bone health among postmenopausal women in Latvia found that as age increased, bone mass density in the lumbar spine and femoral neck region decreased. Lower body weight is also associated with lower bone mass density (Pavlina *et al.*, 2013).

However, researchers in Latvia previously have not evaluated the impact of fermented milk product intake on bone health. Therefore, the aim of this study was to evaluate nutrition and bone health among postmenopausal Latvian women and to assess the impact of yoghurt consumption on bone health.

MATERIALS AND METHODS

The inclusion criteria for participating women were:

- 45 to 69 years old; and
- postmenopausal (no menstrual bleeding for at least 12 months).

The exclusion criteria were:

- women receiving glucocorticoid therapy;
- women diagnosed with osteoporosis prior to the study (self-reported data);
- women with severe chronic diseases; and
- women with chronic digestive diseases and therefore following a specific diet.

Originally, 59 participants started this cross-sectional pilot study (from June 2021 till January 2022), but seven women dropped out at some point in the study (drop-out rate 12%). Reasons for drop-out were:

- non-response to the researcher after agreeing to participate in the study (n = 2);
- did not complete a 72-hour food diary prior to the eight-week experiment (n = 2);
- refusal to participate in the 25-OH-Vitamin D and calcium analysis after the eight-week experiment (n = 2); and
- one participant from the experimental group experienced digestive issues from daily consumption of yoghurt.

Participants were recruited on the principle of convenience (from the researchers' own social network). To evaluate the impact of yoghurt intake on bone health and intestinal microbiome (data reported by Aumeistere *et al*., 2022), the participants were divided into two groups — experimental group with participants who on daily basis consumed 175 g of plain organic milk yoghurt for eight weeks (n = 26) and the control group (n = 26).

If the woman agreed to participate, the first meeting with a researcher was coordinated. During the first meeting, the procedure of the study was explained, after which a series of questionnaires were completed, including a questionnaire on the subject's socio-demographic background, health status, and lifestyle factors. Data regarding hip and waist circumferences were also obtained. The anthropometric measurement protocol described by World Health Organisation (WHO, 2017) was used. Hip and waist circumferences were taken using a measuring tape (Measuring tape 201, SECA, Hamburg, Germany).

To evaluate energy and nutrient intake, participants had to complete a 72-hour food diary prior to and after the eight-week experiment. Participants from the control group were able to consume a self-selected diet. Participants from the experimental group were also able to consume a self-selected diet, except that they had to on a daily basis additionally consume 175 g of plain organic milk yoghurt (JSC Tukuma piens, Latvia). The list of ingredients, energy and nutritional value of the yoghurt are listed in Table 1.

Obtained nutritional data from the food diaries were analysed using the Latvian national food composition database (not publicly available). If a participant was using dietary supplements, the nutritional information was taken from the Food and veterinary service Register of Food Supplements (PVD, 2023) and included in the calculation of total nutrient intake.

All participants also had to donate a blood sample for the determination of calcium and 25-OH-Vitamin D blood serum levels prior to and after the eight-week experiment. Analysis of blood samples was performed in an accredited laboratory (ISO/IEC 17025 and ISO 15189).

Participant bone mass density was measured by DEXA prior to starting the eight-week experiment. Bone mass density was evaluated both at the femoral neck and lumbar spine region (L1 to L4). DEXA was performed by a radiologist trained in DEXA interpretation. The results of DEXA were expressed as T-scores — numbers that compare the condition of a participant's bone mass density to that of a healthy 20 to 29-year-old Caucasian female (expressed in standard deviations) (LOKMSA, 2011). Body mass and height were measured before the DEXA. The body mass index was calculated based on the obtained values.

IBM SPSS Statistics 23 was used for data statistical analysis. Data were expressed as mean ± standard deviation and minimal–maximal values. Non-parametrical statistical tests such as Wilcoxon signed-rank test, Independent Samples Median test and Spearman correlation were applied to analyse the data. A p-value of ≤ 0.05 was considered statistically significant.

Table 1. Description of the yoghurt consumed among the participants from the experimental group

Packaging – cup
Weight/capacity – 350 g
List of ingredients – milk, milk protein, lactic acid bacteria 1.4 $*10^9$ CFU g^{-1}

Nutrition declaration	Values per 100 g
Energy value	289–327 kJ / 69–78 kcal
Fat, of which	3.5–4.5 g
– saturates	2.4–3.0 g
Carbohydrates, of which	4.5 g
– sugars	4.5 g
Protein	4.8 g
Salt [1]	0.10 g
Calcium	132 mg
Vitamin D	< 10 µg

[1] the salt content is exclusively due to the presence of naturally occurring sodium.

RESULTS

The characteristics of the participants are compiled in Table 2. Seventeen of the participants had a normal body mass index, 18 participants were overweight, and 17 participants were obese (obesity class I for 11 participants, obesity class II for 4 participants and obesity class III for 2 participants).

Protein intake was within the recommended ranges set by Latvian national dietary guidelines (Table 3). Calcium intake among the control group was lower than recommended, but within recommendations among the participants from the experimental group (Table 3). Dominant calcium sources in the diet were milk products (mainly cheese and fermented milk products) and mineral water. Milk and milk products were consumed on a daily basis by the majority of the participants. However, overall milk and milk product intake was insufficient — on average only 1.7 portions compared to recommended two to three portions per day (VM, 2020).

Vitamin D intake was above the minimal recommended intake of 10 µg set for adults (Table 3) and higher vitamin D intake was observed after the eight-week experiment compared to daily vitamin D intake before the experiment (p = 0.006 for the control group and p = 0.002 for the experimental group).

Only 15 participants had previously already done a DEXA scan (11 participants from the control group and four participants from the experimental group). For five of them, a previous DEXA scan had already indicated osteopenia.

Table 2. Characteristics of the participants

Characteristics	Control group (n = 26)	Experimental groups (n = 26)
Age (years)	58 ± 5 (49–69)	57 ± 4 (51–69)
Education level	Secondary education (n = 2) Higher education (n = 24)	Secondary education (n = 2) Higher education (n = 24)
Body mass index ($kg \cdot m^{-2}$)	27.82 ± 4.62 (20.87–38.93)	28.35 ± 6.26 (19.20–44.47)
Waist circumference (cm) [1]	93 ± 12 (72–112)	93 ± 14 (73–124)
Waist-to-hip ratio [1]	0.86 ± 0.08 (0.70–1.01)	0.85 ± 0.07 (0.76–1.02)
Last menstrual period [1]	Before 12 months (n = 4) Before 13–24 months (n = 1) More than 24 months ago (n = 20)	Before 12 months (n = 2) Before 13–24 months (n = 7) More than 24 months ago (n = 17)
Pregnancies	2 ± 2 (0–7)	3 ± 1 (0–6)
Deliveries	1 ± 1 (0–3)	2 ± 1 (0–4)
Smoking	never (n = 15) used to smoke (n = 8) occasionally (n = 2) daily (n = 1)	never (n = 20) used to smoke (n = 4) occasionally (n = 2) daily (n = 0)
Use of alcohol	never (n = 2) once a month or less often (n = 6) 2 to 4 times a month (n = 14) 2 to 3 times a week (n = 2) 4 and more times a week (n = 2)	never (n = 2) once a month or less often (n = 11) 2 to 4 times a month (n = 10) 2 to 3 times a week (n = 3) 4 and more times a week (n = 0)
Use of dietary supplements containing vitamin D	n = 8 (prior to the 8-week experiment) n = 13 (after the 8-week experiment)	n = 6 (prior to the 8-week experiment) n = 7 (after the 8-week experiment)
Use of dietary supplements containing calcium	n = 4 (prior to the 8-week experiment) n = 4 (after the 8-week experiment)	n = 1 (prior to the 8-week experiment) n = 1 (after the 8-week experiment)
Use of sunscreen	never (n = 6) on daily basis (n = 7) only while sunbathing or spending prolonged time in sun (n = 13)	never (n = 3) on daily basis (n = 9) only while sunbathing or spending prolonged time in sun (n = 14)
Bone fractures	none (n = 15) yes, but not in the last 3 years (n = 8) yes, in the last 3 years (n = 3)	none (n = 18) yes, but not in the last 3 years (n = 5) yes, in the last 3 years (n = 3)
Use of birth control pills before the menopause [1]	yes (n = 6) no (n = 19)	yes (n = 8) no (n = 18)

[1] One participant did not provide the answer.

Table 3. Energy and nutrient intakes among the participants (n = 52)

Nutrient (Unit)	Control group (n = 26)		Experimental group (n = 26)		RI [1]
	Before the 8-week experiment	After the 8-week experiment	Before the 8-week experiment	After the 8-week experiment	
Energy (kcal)	1743.49 ± 421.50 (1038.40–2971.55)	1931.03 ± 799.76 (842.19–4455.79)	1815.80 ± 552.41 (940.10–3213.53)	1754.19 ± 595.45 (1026.27–3539.16)	1840–2360 (31–61 year) 1700–2170 (> 61 year) (VM, 2017)
Protein (E%)	18.23 ± 4.53 (10.27–24.54)	18.58 ± 6.13 (8.39–33.08)	18.99 ± 5.56 (10.60–40.73)	18.40 ± 5.50 (11.51–37.43)	10–20 (VM, 2017)
Carbohydrates (E%)	37.04 ± 9.20 (13.21–48.86)	40.12 ± 9.35 (17.66–54.87)	38.20 ± 7.30 (27.67–55.83)	39.97 ± 9.88 (23.24–69.17)	45–60 (VM, 2017)
Fat (E%)	40.67 ± 8.44 (26.08–63.79)	37.30 ± 8.03 (23.89–58.68)	39.71 ± 6.83 (23.79–49.23)	38.98 ± 8.35 (13.02–53.95)	25–30 (VM, 2017)
Calcium (mg)	711.83 ± 285.43 (236.42–1357.39)	711.83 ± 285.43 (236.42–1357.39)	1041.61 ± 765.60 (419.13–4522.90)	838.94 ± 363.79 (366.62–1871.12)	800 (VM, 2017)
Vitamin D (μg)	23.36 ± 41.54 (0.31–130.63)	53.72 ± 67.20 (0.73–302.08)	14.95 ± 28.38 (0.03–126.05)	15.98 ± 30.17 (0–120.11)	10 (VM, 2017) 20 to 25 (LOKMSA, 2011)

[1] The term "recommended intake" (RI) refers to the amount of a nutrient that meets the known requirement and maintains good nutritional status among practically all healthy individuals in a particular life stage (NNR, 2014; VM, 2017).

DEXA performed before the eight-week experiment revealed osteoporotic values at the lumbar spine or femoral neck region for ten participants (Table 4). Osteopenia and osteoporosis were more common among older participants, although the observed association was only weakly positive ($\rho = 0.297$, $p = 0.040$).

The average calcium level in blood serum samples among the study participants was within reference values (2.1–2.6 mmol·l^{-1}, Table 5) (EGL, 2023).

Seven participants from the control group and eight participants from the experimental group had an insufficient level of 25-OH-Vitamin D in blood serum (20.0–29.9 ng·ml^{-1}) (Table 5 and Fig. 1). One participant from each study group was vitamin D deficient (25-OH-Vitamin D blood serum level below 20 ng·ml^{-1}).

Higher 25-OH-Vitamin D blood serum levels were observed among the participants who reported the use of vitamin D supplements ($\rho = 0.405$, $p = 0.004$ for 25-OH-Vitamin D levels before the eight-week experiment, $\rho = 0.382$, $p = 0.007$ for the 25-OH-Vitamin D levels after the experiment).

Lower 25-OH-Vitamin D blood serum levels were observed among women with a higher body mass index ($\rho = -0.312$, $p = 0.025$ for 25-OH-Vitamin D levels before the eight-week experiment, $\rho = -0.419$, $p = 0.003$ for the 25-OH-Vitamin D levels after the experiment).

Based on 25-OH-Vitamin D blood serum analysis done prior to the eight-week experiment, both osteopenia and osteoporosis were observed among participants with insufficient, sufficient and optimal 25-OH-Vitamin D levels (Fig. 2).

Total calcium intake did not affect the calcium blood serum levels both prior ($\rho = -0.298$, $p = 0.078$) and after the eight-week experiment ($\rho = 0.255$, $p = 0.139$).

There was no significant correlation between 25-OH-Vitamin D or calcium blood serum level and DEXA results ($p = 0.166$ and $p = 0.972$, respectively).

Table 4. Evaluation of bone mineral density level among the participants based on the dexa scan

Bone mineral density level	Values for bone mineral density[1]	Control group (n = 26)	Experimental group (n = 26)
Normal	t-score ≥ –1.0	n = 12 (at the lumbar spine) n = 12 (at the femoral neck)	n = 17 (at the lumbar spine) n = 17 (at the femoral neck)
Osteopenia	–1.0 > t-score > –2.5	n = 7 (at the lumbar spine) n = 13 (at the femoral neck)	n = 8 (at the lumbar spine) n = 8 (at the femoral neck)
Osteoporosis	t-score ≤ –2.5	n = 7 (at the lumbar spine) n = 1 (at the femoral neck)	n = 1 (at the lumbar spine) n = 1 (at the femoral neck)

[1] LOKMSA, 2011

Table 5. 25-OH-vitamin D and calcium status among the participants

Biological markers in blood samples	Control group (n = 26)		Experimental group (n = 26)	
	Before the 8-week experiment	After the 8-week experiment	Before the 8-week experiment	After the 8-week experiment
25-OH-Vitamin D (ng ml^{-1})	36.3 ± 11.1 (18.1–51.4)	33.7 ± 10.9 (16.2–48.8)	35.3 ± 11.9 (16.1–58.4)	37.3 ± 14.0 (12.5–56.9)
Calcium (mmol l^{-1})	2.4 ± 0.1 (2.3–2.5)	2.4 ± 0.1 (2.1–2.6)	2.4 ± 0.1 (2.2–2.6)	2.4 ± 0.1 (2.3–2.5)

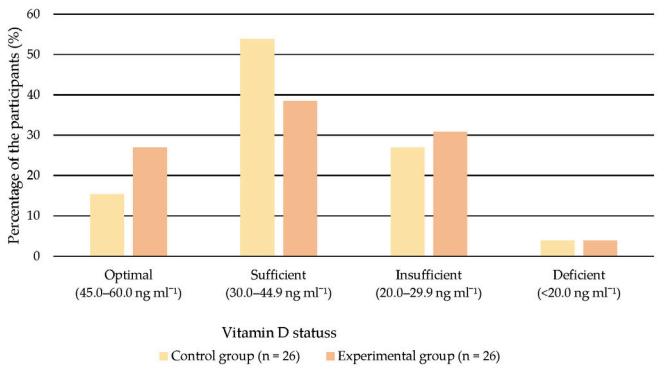

Fig. 1. 25-OH-Vitamin D status among the study participants (average values, n = 52)

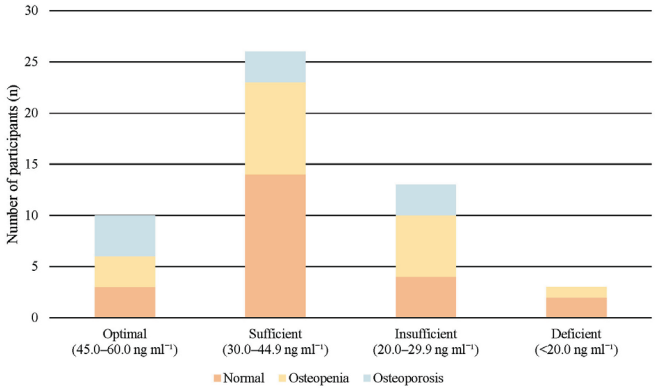

Fig. 2. 25-OH-Vitamin D status among the study participants based on DEXA results (n = 52)

DISCUSSION

Energy intake among study participants (~1700 to 1900 kcal) was close to recommended intakes (VM, 2017). The average protein intake among study participants (19 E%) was similar to previously reported data (VM, BIOR, 2020). Other macronutrient intakes reported in this study (~38 E% for carbohydrates, ~39 E% for fat) were also similar to previously reported intakes among 50 to 64 years old women in Latvia (VM, BIOR, 2020).

Milk products are recommended as the main source of calcium in the diet and should be consumed on daily basis, preferably two to three portions per day (Kanis *et al*., 2019; VM, 2020). On average milk and milk product intake was lower than two portions per day. This could explain why the daily calcium intake only reached the lowest daily intake recommended for adults (800 mg) (VM, 2017). Previous research from Latvia also reported low calcium intake among women aged 50 to 64 years (~700 mg per day) (VM, BIOR, 2020). Precautionary measures should be taken, and calcium-rich food (like fermented milk products) intake should be more popularised among postmenopausal women in Latvia.

A significantly higher vitamin D intake was reported in this study (~27 μg per day) compared to previously reported values (8 μg per day) (VM, BIOR, 2020). This could be explained by the fact that the use of dietary supplements increased (especially in the control group) after participants had blood analysis and became aware of their vitamin D status.

One of the exclusion criteria for participation in this study was a known diagnosis of osteoporosis. Therefore, it was surprising that DEXA performed before the eight-week experiment revealed osteoporotic values at the lumbar spine or femoral neck region for ten participants. Of them, seven were participants who had not previously done a DEXA scan. This indicates that osteoporosis is often not diagnosed early and is thus undertreated. Accurate and early diagnostics are important to educate women about their bone health and to evaluate osteoporosis prevention and treatment options for each woman (LOKMSA, 2011). Providing postmenopausal women with DEXA results and informing them about fracture risk increases women's awareness about bone health and initiates preventive measures, for example, increased calcium intake (McLeod and Johnson, 2011).

Previous studies in Latvia have already reported that a woman's age is a negative factor related to decreased bone mass density (Pavlina *et al.*, 2013), which was also observed in this study. However, the observed association was only weakly positive ($\rho = 0.297$, $p = 0.04$).

Adequate blood serum levels of both 25-OH-D vitamin and calcium are associated with 12% reduced risk for all types of fracture and a reduced rate of bone loss; therefore, it is important to keep track of these values (Tang *et al.*, 2007). Overall, the average calcium level in blood serum samples among the study participants was within reference values (2.1–2.6 $mmol \cdot l^{-1}$). Nevertheless, it should be noted that approximately 31% of the participants from the control group and ~35% of the participants from the experimental group had insufficient 25-OH-D vitamin levels (20.0–29.9 $ng \cdot ml^{-1}$) or had a vitamin D deficiency (< 20.0 $ng \cdot ml^{-1}$). Low vitamin D level leads to impaired calcium absorption and therefore increased risk for osteoporosis (LOKMSA, 2011).

Additional D vitamin intake via dietary supplements (20 to 25 μg or 800–1000 IU per day) is recommended, especially for postmenopausal women (LOKMSA, 2011). Higher 25-OH-Vitamin D blood serum levels were observed among the participants who reported use of vitamin D supplements. Lower 25-OH-D vitamin blood serum levels were observed among participants with a higher body mass index ($\rho = -0.312$, $p = 0.025$ for vitamin D levels before the eight-week experiment, $\rho = -0.419$, $p = 0.003$ for the vitamin D levels after the eight-week experiment). Similar observations have also been previously reported by Lejnieks *et al*. (2013). For people with obesity, enhanced vitamin D uptake by adipose tissue has been observed. Therefore, people with obesity need a higher dose of vitamin D to achieve the same level of vitamin D as people with a normal body mass index. However, this does not always reflect a clinical problem and actual body stores of vitamin D may be adequate to maintain a stable level of vitamin D (Walsh *et al.*, 2017).

A significant difference in calcium blood serum level was not found after daily consumption of plain organic milk yoghurt for eight weeks. The obtained data is not surprising as calcium blood serum levels are mostly stable and only influenced by a significantly low vitamin 25-OH-D blood serum level (which was not common among the participants of this study) or severe diseases (chronic kidney disease, cirrhosis of the liver etc.) (EGL, 2023; King's College London, 2023). The use of certain products cannot directly change bone health, but it can improve body functions in general (such as blood circulation, on which bone health depends).

CONCLUSIONS

Although no significant differences were found related to yoghurt consumption and bone health, the obtained data still are significant. Calcium intake among postmenopausal women in Latvia could be higher. Intake of calcium-rich foods (like fermented milk products, including yoghurt) should be more popularised among postmenopausal women in Latvia. Postmenopausal women should be also more educated about vitamin D supplementation to reduce the risk of osteoporosis. To increase women's awareness about bone health, health professionals should recommend postmenopausal women to evaluate their bone mineral density by DEXA scan, especially if there already is a bone fracture in the recent medical history.

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ETHICS

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Rīga Stradiņš University Ethics Committee (protocol code No. 22-2/278/2021, date of approval 15 April 2021). Informed consent was obtained from all subjects involved in the study.

AUTHORS' CONTRIBUTIONS

I.S., M.K. – conceptualisation, I.S., M.K. – methodology, M.K., O.L. – collection of data, M.K., O.L., I.S. – inspection and analysis of food records, L.A. – data analysis and interpretation, L.A. – writing, visualisation, original draft preparation, I.C., M.K., I.S. L.V.N., O.Ļ. – writing, review and editing; I.C., L.V.N. – supervision, I.C., L.V.N. – project administration, I.C. – funding acquisition. All authors have read and agreed to the published version of the manuscript.

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UZTURS UN KAULU VESELĪBA SIEVIETĒM LATVIJĀ PĒCMENOPAUZES PERIODĀ

Skābpiena produkti ir nozīmīgs kalcija un olbaltumvielu avots uzturā, vitāli svarīgs kaulu veselībai. Pētījuma mērķis bija novērtēt uzturu un kaulu veselību sievietēm Latvijā pēcmenopauzes periodā un jogurta patēriņa ietekmi uz kaulu veselību. Tika izveidotas divas pētījuma grupas — kontroles grupa (n = 26) un eksperimentālā grupa (n = 26). Pētījums ilga astoņas nedēļas. Abām pētījuma grupām netika noteikti uztura ierobežojumi, bet eksperimentālajai grupai katru dienu papildus bija jāuzņem 175 g ekoloģiskais bezpiedevu jogurts. Pirms un pēc pētījuma dalībnieces aizpildīja 72 stundu uztura dienasgrāmatas. Lai novērtētu kaulu masas blīvumu, dalībniecēm pirms pētījuma veikta osteodensitometrija (DEXA). Pirms un pēc pētījuma veiktas arī asins analīzes, nosakot 25-OH-D vitamīna un kalcija līmeni asins serumā. DEZA atklāja osteoporozi mugurkaula skriemeļos (L1 līdz L4) vai gūžas kakliņā desmit dalībniecēm. Vidēji 25-OH-D vitamīna līmenis asins serumā dalībnieču vidū bija pietiekams (30,0–44,9 $ng \cdot ml^{-1}$). Kalcija līmenis serumā visām dalībniecēm bija references vērtību robežās (2,1–2,6 $mmol \cdot l^{-1}$). Netika konstatētas būtiskas atšķirības starp jogurta lietošanu un kalcija līmeni asins serumā (p = 0,400). Dienā uzņemtais kalcija daudzums pētījuma dalībniecēm sasniedza minimālo dienā ieteicamo devu, kas tiek rekomendēts pieaugušajiem (800 mg). Turklāt uzņemtais piena un piena produktu daudzums dalībnieču uzturā faktiski bija mazāks (vidēji 1,7 porcijas dienā) nekā rekomendētās 2–3 porcijas dienā. D vitamīna uzņemšana ar pārtiku un uztura bagātinātājiem pētījuma dalībniecēm ievērojami atšķīrās (no 0 līdz 302,08 μg dienā). Kopumā sievietes pēcmenopauzes periodā Latvijā nepietiekami uzņem kalciju, tādēļ būtu nepieciešams vairāk popularizēt kalciju saturošu pārtikas produktu (piemēram, skābpiena produktu) lietošanu uzturā. Sievietes pēcmenopauzes periodā būtu vairāk jāizglīto par D vitamīna uzņemšanu osteoporozes riska mazināšanai.