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Vitamin D deficiency is common in orthopaedic ward staff

Powszechny niedobór witaminy D u pracowników oddziału ortopedycznego

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Summary

Introduction. Vitamin D deficiency is common in many populations and its health are not limited to bone.

Aim. To determine vitamin D concentrations at its minimum in orthopaedic ward staff.

Material and methods. In early spring we measured 25(OH)D concentrations in 18 asymptomatic health professionals (nurses and physicians, 10 women, 8 men) 30-55 years of age (average 39.8).

Results. We observed mean vitamin D concentration of 14.25 ng/ml (SD = 5.55, median = 12.85). None of the subjects reached a normal concentration, which means 100% deficiency in this population.

Conclusions:

1. In a group of physicians and nurses investigated in early spring we observed 100% of subjects with vitamin D deficiency.
2. Vitamin D deficiency is common and easily correctable. Vitamin D supplementation is indicated also in medical professionals.

Key words: vitamin D, deficiency, consequences

Streszczenie

Wstęp. Niedobór witaminy D jest powszechny w wielu populacjach, a konsekwencje tego niedoboru wykraczają poza układ kostny.

Cel pracy. Ocena stężenia witaminy D u pracowników oddziału ortopedycznego w okresie jego fizjologicznego minimum.

Materiał i metody. Wczesną wiosną przebadano asymptomatycznych 18 osób (10 kobiet, 8 mężczyzn) w wieku od 30 do 55 lat (średnio 39,8 lat) będących pracownikami szpitala (pielęgniarki i lekarze). U wszystkich osób wykonano oznaczenie stężenia 25(OH)D we krwi.

Wyniki. W badanej grupie stwierdzono średnie stężenie 25(OH)D równe 14,25 ng/ml (odchylenie standardowe = 5,55, mediana = 12,85). U żadnego z badanych nie stwierdzono zalecanego stężenia witaminy D, co oznacza 100% rozpowszechnienie niedoboru.

Wnioski:

1. W badanej wczesną wiosną grupie lekarzy i pielęgniarek stwierdzono 100% rozpowszechnienie niedoboru witaminy D.
2. Niedobór witaminy D jest powszechnym i łatwo korygowalnym zaburzeniem. Suplementacja witaminy D jest konieczna także u osób profesjonalnie zajmujących się medycyną.

Słowa kluczowe: witamina D, niedobór, konsekwencje

INTRODUCTION

Reduced concentrations of vitamin D were observed in numerous populations around the world (1-5). High prevalence of deficiency was noted in elderly, in patients with reduced sun exposure due to cultural reasons, in overweight patients, in black-skinned individuals and also in physicians in training (6, 7) (American data). Vitamin D is synthesized after exposition to sun

(wavelength 290-315 nm – UVB). At the geographical latitude that Poland is situated synthesis is not observed between October and March and even in summer may be ineffective (8) for obtaining desired concentrations. Additionally, individuals working indoors (physicians, nurses) are not exposed to sun in the midday period.

In vitamin D deficiency intestinal resorption of calcium is reduced. Reduced serum calcium concentration

leads to increase in parathyroid hormone excretion, which in turn mobilizes calcium from bone leading to abnormal bone mineralization. Vitamin D is also a hormone active in muscle tissue and its deficiency leads to proximal myopathy (9).

Active form of vitamin D – $1.25(OH)_2D_3$ – is a hormone directly influencing gene expression (10). Epidemiological data shows, that adequate concentration of vitamin D is related to reduced risk of death due to colon cancer, prostate cancer, breast cancer and pancreatic cancer (11-13). Reduced concentration of vitamin D has been linked to autoimmune diseases: type I diabetes mellitus, *sclerosis multiplex*, Crohn disease and rheumatoid arthritis. Patients with vitamin D deficiency are at greater risk of cardiovascular diseases, including hypertension. Correction of deficiency leads to reduction in blood pressure of 6 mmHg (14). Vitamin D has been linked to type II diabetes, resistance to insulin and metabolic syndrome (15).

AIM

This study was performed to assess vitamin D concentrations – as 25(OH)D – among healthy employees of orthopedic hospital. The sampling was performed in the early spring, when yearly minimum of concentration is located. This study aimed to show that among healthy medical professionals vitamin D deficiency can be observed and to prompt the subjects to introduce supplementation.

MATERIAL AND METHODS

Eighteen asymptomatic subjects were enrolled, among them 10 women and 8 men, 6 nurses and 12 physicians, aged 30 to 55 years (mean 39.8 years) employed at prof. Adam Gruca Clinical Hospital in Otwock. Samples were collected in 13th and 14th week of the year. One subject (marked with square in figure 1) used oral supplementation of vitamin D (cholecalciferol 1500 units daily). Two subjects declared high sun exposure and another two spent at least one week in the sun reach-country in the 3 months preceding the investigation.

After informed consent was obtained 5 mL of venous blood was drawn. After centrifugation serum was frozen in -38°C and then transferred for testing with LIAISON test (DiaDorin). LIAISON is an indirect competitive test employing technology of chemiluminescent immunologic testing. It measures combined concentration of $25(OH)D_2$ and $25(OH)D_3$ form of vitamin D (16-18).

RESULTS

Mean concentration of 25(OH)D was 14.25 ng/mL (standard deviation = 5.55, median = 12.85).

In this group sampled in early spring no subject achieved normal concentration of 25(OH)D (fig. 1). In the subject that used supplementation, the concentration was relatively high, but didn't reach normal values (fig. 1, square).

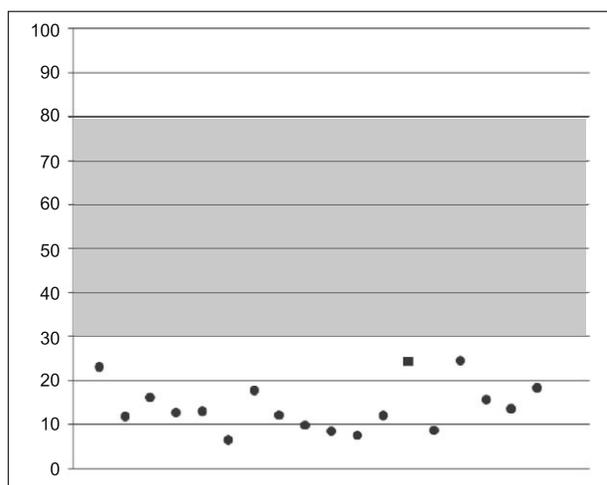


Fig. 1. Results in the investigated group. Vertical axis – 25(OH) D concentration (ng/ml). Grey area corresponds to normal values. Subject marked with square used supplementation.

In this group of symptom-free subjects severe deficiency of vitamin D was observed in 28%. Literature search revealed that such deep deficiency leads to: elevated PTH secretion, reduced calcium absorption, osteomalacia and myopathy (tab. 1) (19). In 56% of subjects moderate deficiency was observed, which leads to elevation of PTH concentration, reduced intestinal calcium absorption and subclinical myopathy. Another 17% of subjects mild deficiency leading to mild elevation of PTH concentration was observed.

Table 1. Terminology describing status of vitamin D nutrition (25(OH)D concentration) (19).

	25(OH)D (ng/ml)	Percentage
Severe deficiency	0-10	28%
Moderate deficiency	10-20	56%
Light deficiency	20-30	17%
Normal concentration	30-80	0%

DISCUSSION

The direct conclusion of the investigation is revealing, that all subjects require treatment of vitamin D deficiency with subsequent supplementation at least in the winter-spring period. Lately the issue of ineffective skin synthesis in the summer months has been studied (20). This is caused by high geographical latitude and the life style leading to reduced sun exposure. Probably supplementation should be encouraged also in summer months.

Physicians and nurses of the orthopaedic ward have easy access to musculoskeletal information. It has been shown that this access does not lead to behavior leading to proper vitamin D concentration. Even the subject using supplementation didn't achieve a target concentration of vitamin D.

An important limitation of this study was a limited number of subjects, which was caused by the availability of staff in the short period of time.

A studied population may not be representative to whole population of hospital employees as only consenting individuals were studied. There are, however, no clues to the non-representativeness of the studied population (standard diet, two subjects declared high sun exposure, two subjects travelled to sun-reach regions).

In authors opinion results can be generalized do all employees of our and other hospitals. If no active form of supplementation of vitamin D is undertaken, than at the end of the winter more or less pronounced deficiency exists with all its health consequences (15).

Vitamin D deficiency is an easily correctable abnormality with important health consequences (19). Spreading this knowledge among health professionals is the first step to popularizing it in the whole society.

CONCLUSIONS

1. In a group of physicians and nurses studied in the early spring 100% prevalence of vitamin D deficiency was observed.
2. Vitamin D deficiency is common and easily correctable abnormality. Health professionals are in need of vitamin D supplementation.

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