Hypovitaminosis D in Thailand

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The hypovitaminosis D in the premenopausal women and the postmenopausal elderly women in Thailand was investigated. One hundred and six cases of the elderly women living in the urban area of Khon Kaen province, one hundred and thirty-two cases of the elderly women living in the rural area of Khon Kaen province, ninety-eight cases of the postmenopausal women who attended Menopausal Clinic, Srinagarind Hospital, Khon Kaen province, and 357 premenopausal women from the multicenters in Thailand were the subjects. The serum level of 25(OH)D ≤ 35 ng/ml was used as the cut-off point of hypovitaminosis D. The prevalence of hypovitaminosis D in these selected groups of women was 65.4, 15.4, 60.2, and 77.8 percent respectively. The premenopausal female group had the highest prevalence of hypovitaminosis D and the lowest level of 25 (OH) D whereas the group of the postmenopausal elderly women in the rural area had the lowest prevalence of hypovitaminosis D and the highest 25 (OH) D level.

Keywords: *Prevalence, Hypovitaminosis D, Elderly women, Postmenopausal women, Premenopausal women*

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Vitamin D is required for the efficient absorption of dietary calcium and for the normal bone mineralization. The reduction in vitamin D levels is associated with the impaired calcium absorption and the compensatory increase in the level of parathyroid hormone (PTH)[1-3] which stimulates bone resorption and causes bone loss. The advancing age is associated with the reduction in sun exposure, vitamin D intake including vitamin D absorption, and skin activation of vitamin D. All of these contribute to hypovitaminosis D or low serum levels of vitamin D[4,5].

The previous study[6] found that 65.4% of the elderly women in the urban area of Khon Kaen, Thailand had hypovitaminosis D. There were many critics and doubts based on the traditional belief that Thai people had no vitamin D deficiency. The people from the certain defined areas having the different vitamin D status might result from the differences of age and lifestyle.

This study was aimed to compare the serum 25(OH)D or calcidiol and the serum parathyroid hormone concentrations of the different age groups in different areas.

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Material and Method

We had previously studied 106 cases of the elderly women living in the urban area of Khon Kaen province, 132 cases of the elderly women living in the rural area of Khon Kaen province, 98 cases of the postmenopausal women who attended Menopausal Clinic, Srinagarind Hospital, Khon Kaen province[6-8], and later studied 357 premenopausal women from the multicenters in Thailand[9]. None of the participants had paralysis or debility, a history of metabolic or hormonal disorders which might affect calcium and bone metabolism. Moreover, none had taken any medication within 6 months generally influencing the bone turnover, *e.g.* estrogens, selective estrogen recept or modulators, bisphosphonates, calcitonins, vitamin D, phenytoin, carbamazepine, and rifampicin.

The clinical characteristics: age, weight, height, and BMI were reviewed. A single 10 ml of overnight fasting blood sample was collected from each subject: 5 ml kept in a sterile tube for the determination of alkaline phosphatase; and another 5 ml kept in an

EDTA-anticoagulated tube. After being centrifuged for 15 minutes at 760Xg, the EDTA-plasma was separated and stored at -20°C for the analysis of 25(OH)D and PTH.

The serum parathyroid hormone samples were measured by using the electrochemiluminescence (ECLIA) technique on an Elecsys 1010. The serum 25(OH)D samples were measured by using the radio-immunoassay (RIA) technique named a DiaSorin, USA. The interassay coefficient of variation was 7.1 percent for the measurements of the parathyroid hormone and was between 9.4 and 11.0 percent for the 25(OH)D.

Statistical analysis

The baseline clinical characteristics were expressed as the mean (± SD). The serum level of 25(OH)D ≤ 35 ng/ml as the cut-off point of hypovitaminosis D[6-8]. The prevalence of hypovitaminosis D in each group was calculated and presented in percent. The plasma level of 25(OH)D and PTH level of each group were expressed as the mean (95% CI) while the comparison of the study groups was done by using the unpaired t-test. For the statistical significance, p-values must be < 0.05.

Results

The clinical characteristics of all study groups are presented in Table 1.

The serum level of 25(OH)D ≤ 35 ng/ml was used as the cut-off point of hypovitaminosis D. The prevalence of hypovitaminosis D in the study groups was shown in Table 2.

The mean (95% CI) of the 25(OH)D level in all study groups was shown in Fig. 1.

The mean (95% CI) of the PTH levels in all study groups was shown in Fig. 2.

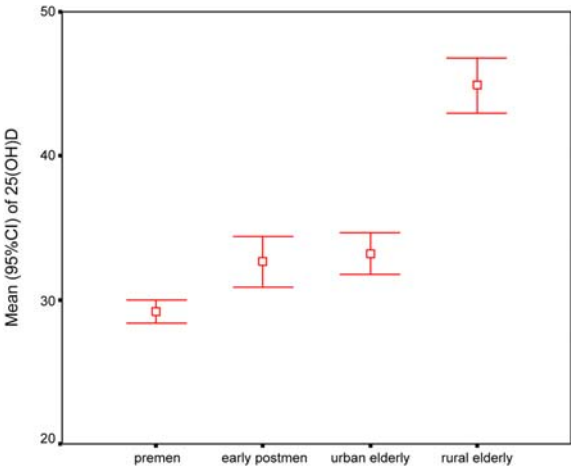

Fig. 1 The comparison of the 25(OH)D levels in all study groups

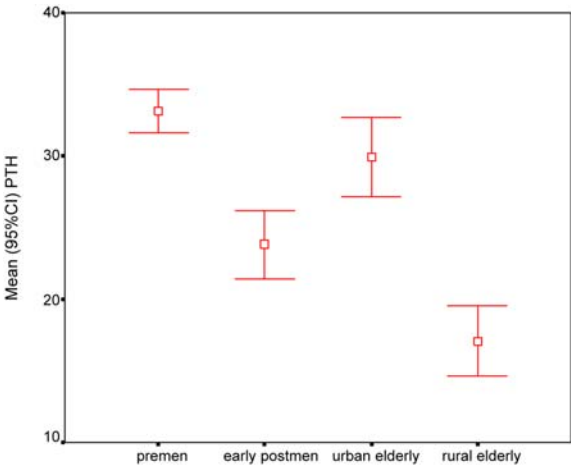

Fig. 2 The comparison of the PTH levels in all study groups

Table 1. The baseline clinical characteristics of all study groups

Characteristic	Postmenopausal group n = 98 (mean ± SD)	Elderly-rural group n = 132 (mean ± SD)	Elderly-urban group n = 106 (mean ± SD)	Premenopausal group n = 357 (mean ± SD)
Age (years)	49.96 ± 4.97	71.55 ± 5.26	69.42 ± 6.77	35.20 ± 8.81
Weight (kg)	57.11 ± 8.53	49.66 ± 0.91	53.45 ± 1.13	54.65 ± 10.31
Height (cm)	154.00 ± 5.00	149.44 ± 0.52	148.44 ± 0.53	156.73 ± 5.76
BMI (kg/m^2)	24.19 ± 3.53	21.44 ± 4.15	24.09 ± 4.73	22.25 ± 4.03
Alk.phos. (U/L)	78.75 ± 24.39	82.75 ± 1.92	95.23 ± 2.36	52.56 ± 22.56
PTH level (pg/mL)	23.72 ± 11.84	17.90 ± 15.28	32.27 ± 17.97	34.97 ± 17.57
25(OH)D (ng/mL)	32.58 ± 8.93	44.89 ± 11.02	33.32 ± 7.14	29.09 ± 7.92

Table 2. The prevalence of hypovitaminosis D in all study groups

	Prevalence of hypovitaminosis D
Postmenopausal group, n = 98	60.2
Elderly-rural group, n = 132	15.4
Elderly-urban group, n = 106	65.4
Premenopausal group, n = 357	77.8

Discussion

The highest prevalence of hypovitaminosis D (Table 2) and the lowest level of 25(OH)D (Fig. 1) in the premenopausal women group implied that hypovitaminosis D was one of the rising problems in Thailand. This might result from sedentary lifestyle, avoiding the sunlight exposure and using more sun-screen cream due to the beauty and cosmetic reason or being afraid of skin cancer. On the other hand, the group of the postmenopausal elderly women in the rural area had the lowest prevalence of hypovitaminosis D (Table 2) and the highest 25(OH)D level (Fig. 1). This might be the result that most of them were exposed to sunlight in the day time as they had the outdoor lifestyle, *i.e.* farming, gardening and cattle herding.

The prevalence of hypovitaminosis D in the adolescent and premenopausal women was rather high in the worldwide publications[10-14]. Sun-screening with the sun protective factor (SPF) being as low as 8 can prevent ultraviolet from the sunlight exposing to skin. Less sunlight exposure, consequently, leads to low synthesize the production process of vitamin D[15]. The premenopausal female group also had significantly higher PTH level than the others (Fig. 2). The high PTH level is a signal of increasing the bone resorption and causing the bone loss that eventually leads to a risk of osteoporosis.

Conclusion

The difference in lifestyle is perhaps the main reason for the high prevalence of hypovitaminosis D in Thailand. The modified lifestyle should be promoted right from the childhood to prevent the continuously rising problem of osteoporosis.

References

1. Need AG, Horowitz M, Morris HA, Nordin BC. Vitamin D status: effects on parathyroid hormone and 1, 25-dihydroxyvitamin D in postmenopausal women. Am J Clin Nutr 2000; 71: 1577-81.
2. Kinyamu HK, Gallagher JC, Balhorn KE, Petranick KM, Rafferty KA. Serum vitamin D metabolites and calcium absorption in normal young and elderly free-living women and in women living in nursing homes. Am J Clin Nutr 1997; 65: 790-7.
3. Chapuy MC, Preziosi P, Maamer M, Arnaud S, Galan P, Hercberg S, et al. Prevalence of vitamin D insufficiency in an adult normal population. Osteoporos Int 1997; 7: 439-43.
4. Gloth FM 3rd, Gundberg CM, Hollis BW, Haddad JG Jr, Tobin JD. Vitamin D deficiency in homebound elderly persons. JAMA 1995; 274: 1683-6.
5. MacLaughlin J, Holick MF. Aging decreases the capacity of human skin to produce vitamin D3. J Clin Invest 1985; 76: 1536-8.
6. Soontrapa S, Soontrapa S, Pongchaiyakul C, Somboonporn C, Somboonporn W, Chailurkit LO. Prevalence of hypovitaminosis D in elderly women living in urban area of Khon Kaen province, Thailand. J Med Assoc Thai 2001; 84 (Suppl 2): S534-41.
7. Soontrapa S, Soontrapa S, Chailurkit L, Sakondhavat C, Kaewrudee S, Somboonporn W, et al. Prevalence of vitamin D deficiency among postmenopausal women at Srinagarind hospital, Khon Kaen province, Thailand. Srinagarind Med J 2006; 21: 23-9.
8. Soontrapa Sk, Soontrapa Sp, Boonsiri P, Khampitak T. Prevalence of hypovitaminosis D in elderly women living in rural area of Khon Kaen province, Thailand. J Med Assoc Thai. In press 2009.
9. Soontrapa Sp, Soontrapa Sk, Bunyaratavej N, Rojanasthien S, Kittimanon N, and Lektrakul S. Vitamin D status of Thai premenopausal women. J Med Assoc Thai. In press 2009.
10. Gonzalez G, Alvarado JN, Rojas A, Navarrete C, Velasquez CG, Arteaga E. High prevalence of vitamin D deficiency in Chilean healthy post-menopausal women with normal sun exposure: additional evidence for a worldwide concern. Menopause 2007; 14: 455-61.
11. Holick MF. Too little vitamin D in premenopausal women: why should we care? Am J Clin Nutr 2002; 76: 3-4.
12. Islam MZ,Lamberg-Allardt C, Karkkainen M, Outila T, Salamatullah Q, Shamim AA. Vitamin D deficiency: a concern in premenopausal Bangladeshi women of two socio-economic groups in rural and urban region. Eur J Clin Nutr 2002; 56: 51-6.

13. Mazess RB. Vitamin D deficiency in premenopausal Pakistani women in Norway. Scand J Clin Lab Invest 2000; 60: 507-8.
14. Falch JA, Steihaug S. Vitamin D deficiency in Pakistani premenopausal women living in Norway is not associated with evidence of reduced skeletal strength. Scand J Clin Lab Invest 2000; 60: 103-9.
15. Matsuoka LY, Ide L, Wortsman J, MacLaughlin JA, Holick MF. Sunscreens suppress cutaneous vitamin D3 synthesis. J Clin Endocrinol Metab 1987; 64: 1165-8.

ภาวะวิตามินดีในกระแสเลือดต่ำในสตรีไทย

สุกรี สุนทราภา, ศุภศิลป์ สุนทราภา, ละออ ชัยลือกิจ

ศึกษาเปรียบเทียบผู้สูงอายุซึ่งอาศัยอยู่ในเขตเมือง จังหวัดขอนแก่น จำนวน 106 ราย ผู้สูงอายุซึ่งอาศัยอยู่ในเขตชนบท จังหวัดขอนแก่น จำนวน 132 ราย สตรีวัยหมดระดูซึ่งมารับการดูแลรักษาที่คลินิกวัยทองโรงพยาบาลศรีนครินทร์ จังหวัดขอนแก่น จำนวน 98 ราย และสตรีวัยก่อนหมดระดูจากจังหวัดต่างๆในประเทศไทย จำนวน 357 ราย โดยใช้ระดับของวิตามินดีที่ ≤ 35 ng/ml เป็นจุดตัดในการวินิจฉัยภาวะวิตามินดีในกระแสเลือดต่ำ ความชุกของภาวะวิตามินดีในกระแสเลือดต่ำของสตรีในกลุ่มดังกล่าวคิดเป็นร้อยละ 65.4, 15.4, 60.2, และ 77.8 ตามลำดับ