

Incidence of vitamin D deficiency in 12-year old children in Japan

Satomi Koyama¹, Junko Naganuma¹, Takuo Kubota², Keiichi Ozono², Osamu Arisaka^{1,3}, Shigemi Yoshihara¹

1. Department of Pediatrics, Dokkyo Medical University, 2. Department of Pediatrics, Osaka University Graduate School of Medicine, 3. Department of Pediatrics, Nasu Red Cross Hospital, Japan

- There are no conflicts of interest to report.

Background

- The incidence of vitamin D deficiency is increasing throughout the world in recent years, but the rate of vitamin D deficiency in Japan is unknown.
- A study in southeastern China suggested that the prevalence of vitamin D deficiency (25 hydroxyvitamin D (25OHD) ≤ 20 ng/ml) was 35% in 7-10 years old and 48% in 11-17 years¹. Another study in Turkey showed it was 55-65% in the age of 10-18².

Objective

- We measured the incidence of vitamin D deficiency in 12-year old children in Japan.

Method

- A total of 492 schoolchildren (247 boys and 245 girls) lived in Otawara city at latitude of 36.52° N in Japan enrolled in this study. At age 12, 25 hydroxyvitamin D (25OHD) were measured in all children by using radioimmunoassay. The levels of intact parathyroid hormone (iPTH), calcium (Ca), phosphorus (P), albumin (Alb), alkaline phosphatase (ALP) and fibroblast growth factor 23 (FGF23) were also measured in the subjects who shows low 25OHD level (≤ 20 ng/ml).

Serum 25OHD levels (ng/ml, RIA)

	mean \pm SD	min~max
Total (n=492)	21.5 \pm 3.3	14~31
Boys (n=247)	22.2 \pm 3.3	15~31
Girls (n=245)	20.9 \pm 3.1	14~29

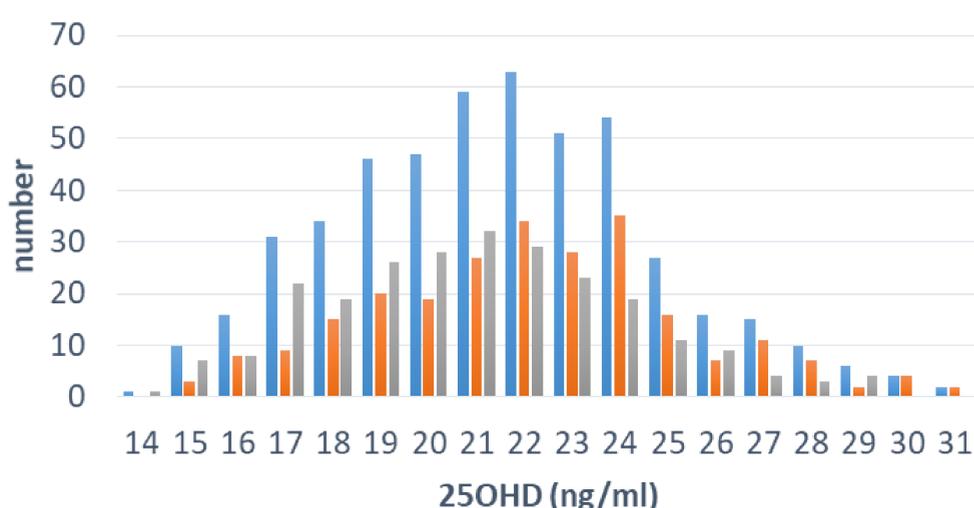
p-value is <0.0001 between boys and girls.

Incidence of vitamin D deficiency in 12-year old children

	25OHD ≤ 20 ng/ml	25OHD ≤ 15 ng/ml
total (n=492)	37.6% (n=185)	2.2% (n=11)
boys (n=247)	30.0% (n=74)	1.2% (n=3)
girls (n=245)	45.3% (n=111)	3.3% (n=8)

Distribution of 25OHD levels in 12-year old children

■ total ■ boys ■ girls



The levels of Ca, P, Alb, ALP, iPTH and FGF23 in subjects who showed vitamin D deficiency

	mean \pm SD	min~max
ALP (U/l)	918.3 \pm 340.1	200~1834
Ca (mg/dl)	9.5 \pm 0.4	8.3~10.7
P (mg/dl)	4.7 \pm 0.6	3.3~6.1
Alb (g/dl)	4.6 \pm 0.3	3.5~5.2
Intact PTH (pg/ml)	22.3 \pm 8.9	4~74
FGF23 (pg/ml)	46.5 \pm 58.2	12~740

The data of boy whose 25OHD level was low and iPTH level was a little high

25OHD (ng/ml)	16	Intact PTH (pg/ml)	74
ALP (U/l)	1484	Ca (mg/dl)	8.5
FGF23 (pg/ml)	23	P (mg/dl)	4.9

Discussion

- We show that 38% of Japanese 12-year old early adolescents suffer from vitamin D deficiency. We also reported the annual incidence of patients with symptomatic vitamin D deficiency among children under 15 years of age was 1.1 per 100,000 population³. In this study no one showed symptomatic vitamin D deficiency.

Conclusion

- Findings from this study indicate that vitamin D deficiency requires close oversight in public health during adolescence.

Reference

1. Wang S et al. Nutrients 9,pii:E319, 2017.
2. Sahin ON, et al. Ital J Pediatr 44:40, 2018.
3. Kubota T et al. Endocrine J. ;65:593-599, 2018.