EVALUATION OF PARATHORMONE AND 25-HYDROXYVITAMIN D STATUS IN A LARGE COHORT OF BELGIAN CHILDREN

A. Ladang, O. Rousselle, L. Huyghebaert, A.-C. Bekeart, S. Kovacs, C. Le Goff, E. Cavalier
Department of Clinical Chemistry, ULiège and CHU of Liège, Belgium

Introduction:

Parathyroid hormone (PTH) is an essential biomarker of calcium/phosphate metabolism. Secondary hyperparathyroidism linked to vitamin D deficiency is largely described. Yet, only few studies are evaluating its prevalence in children. In Belgium, clinicians are generally advising a vitamin D supplementation at high doses in all children under the age of 2 years. From 2 to 6 years old, this supplementation is progressively decreased. In this study, we report PTH levels according to the vitamin D status in large cohort of 1200 Belgian children.

Material and Methods:

We selected 1200 children undergoing allergy exploration. Under the age of 10 years, 40 boys and 40 girls were tested by 2 year age group while from 10 to 20 years, we defined age group of 1 year. PTH was measured on Liaison XL (Diasorin°) with the LIAISON° 1-84 PTH kit (3rd generation PTH). 25-hydroxyvitamin D3, 25-hydroxyvitamin D2 as well as total vitamin D (25-OHVTD) were measured according to our previously described LC/Ms-Ms method.

Results:

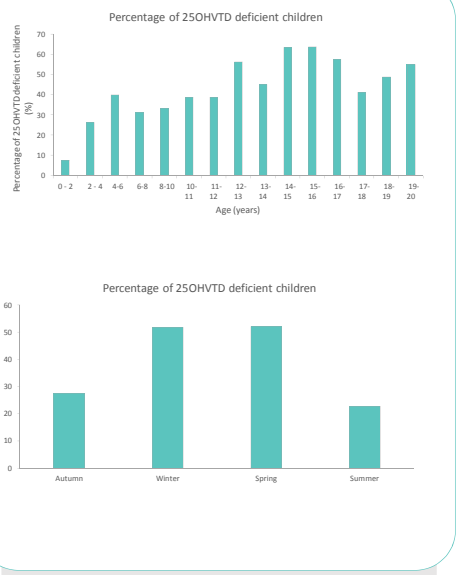

Fig 1. **Vitamin D deficiency in children:** First graph represents the percentage of children with a 25OHVTD below 20 ng/mL according to age. This percentage progressively increases during childhood from 7% in the 0 - <2 years subpopulation (a population largely supplemented according to pediatric recommendation) to reach a mean of 45% during teenage years. The second graph represents the percentage of 25-OHVTD children according to seasons.

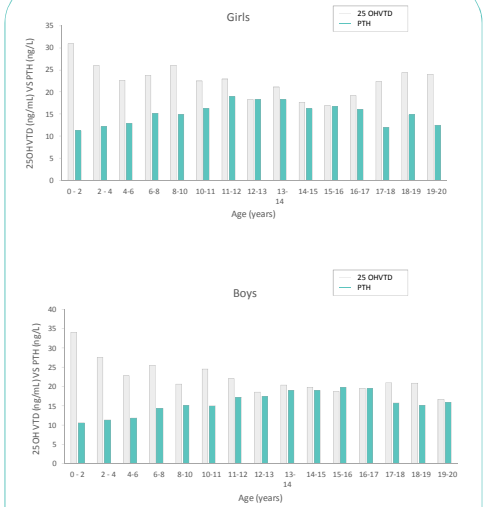

Fig 2. **PTH and 25-OHVTD levels according to age and gender:** PTH levels inversely mirrored 25-OHVTD concentrations for all age and gender subgroups. PTH and 25-OHVTD levels in girls according to age are presented for girls (first graph) and for boys (second graph).

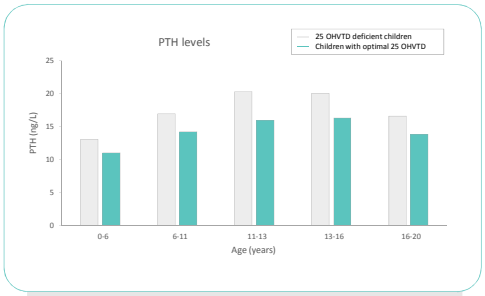

Fig 3. **PTH levels according to 25-OHVTD status:** 25-OHVTD deficient children present systematically a higher PTH levels than non-deficient counterparts. This result highlights the existence of a secondary hyperparathyroidism linked to vitamin D deficiency in children.

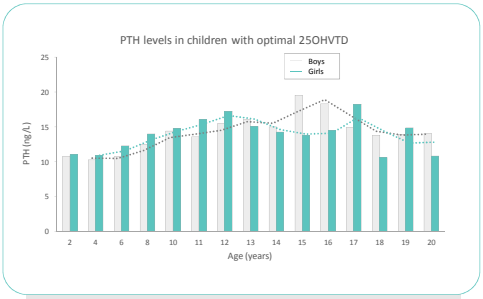

Fig 4. **PTH levels in children harboring a 25-OHVTD above 20 ng/mL:** We observed a PTH peak at puberty for girls of 11 to 13 years old whereas this peak started at 13 years old for boys.

	n	25OHVTD (ng/ml) Mean ± SD	PTH (ng/L) Mean ± SD	Robust interval method without potential outliers
0 - < 6 years	179	31,7 ± 8,6	11,0 ± 4,0	3,6 - 17,4
6 -< 11 years	156	28,7 ± 7,2	14,2 ± 5,2	5,1 - 20,8
11 - < 13 years	84	26,4 ± 5,1	16,1 ± 6,6	5,2 - 24,4
13 - < 16 years	102	26,4 ± 5,4	16,1 ± 6,8	3,4 - 24,7
16 - < 20 years	159	29,2 ± 8,8	13,7 ± 6,3	0 - 25

Fig 5. **PTH reference range according to age:** Those results were established in children harboring a 25-OHVTD above 20 ng/mL

Conclusions:

In this study realized in a large cohort of 1200 Belgian children, we show the existence of secondary hyperparathyroidism linked to Vitamin D deficiency in children. In children with optimal vitamin D status, we observe a higher PTH level during teenage years, probably linked to higher calcium needs for bone formation. Those results further highlight the importance of taking into account 25-hydroxyvitaminD status to establish pediatric PTH reference values.