

# Vitamin D Status of Children in Denizli Province, the Western Part of Turkey

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Vitamin D is an essential fat soluble vitamin and unique hormone that is mainly provided from synthesis in the human skin by natural exposure to sunlight. Few foods supply the daily requirements, but their contributions to the total amount of daily vitamin D needs for the human body are often inadequate to satisfy them. The key function of vitamin D is to help maintain the body's level of calcium-phosphate by increasing their intestinal absorption for the mineralization of bone. Beyond its main role in calcium homeostasis, vitamin D may be involved in diverse physiological and pathological processes in the human body.

The aim of this study was to evaluate the vitamin D status of children aged 0 to 18 years living in the province of Denizli (37.7667 N, 29.0833 E) located in the Aegean part of Turkey.

This study was performed in Denizli province, located in the west of Turkey. Participants were 556 children aged 0 to 18 years who visited Tertiary Medical Center for health and growth status check-ups. We excluded individuals who had chronic conditions such as liver diseases, renal diseases, gastrointestinal system problems, and those on treatment with anticonvulsants or systemic glucocorticoids causing vitamin D deficiency. Children were grouped into 5 categories—infant (0–1 years), toddler (1–3 years), preschool (3–5 years), school-aged (6–12 years) and teenager (12–18 years)—and 4 seasonal groups. We classified 25(OH)D levels by using different cut-off thresholds on the tables.

A total of 556 children (253 male, 303 female) with a mean age of 6.26±6.18 years were included in this study. Biochemical characteristics and the percentage of low 25(OH)D levels using different cut-off thresholds for male and female children are illustrated in Table 1. Clinical vitamin D deficiency was not found in any children. Mean vitamin D levels were higher in the infant and toddler groups than upper age groups. Vitamin D deficiency and insufficiency were more prevalent in teenagers and low vitamin D levels were significantly common in girls. The lowest mean vitamin D levels were detected in autumn and in teenagers (Tables 2, figures 1a and 1b). The differences between gender, seasons, and childhood stages were significant.

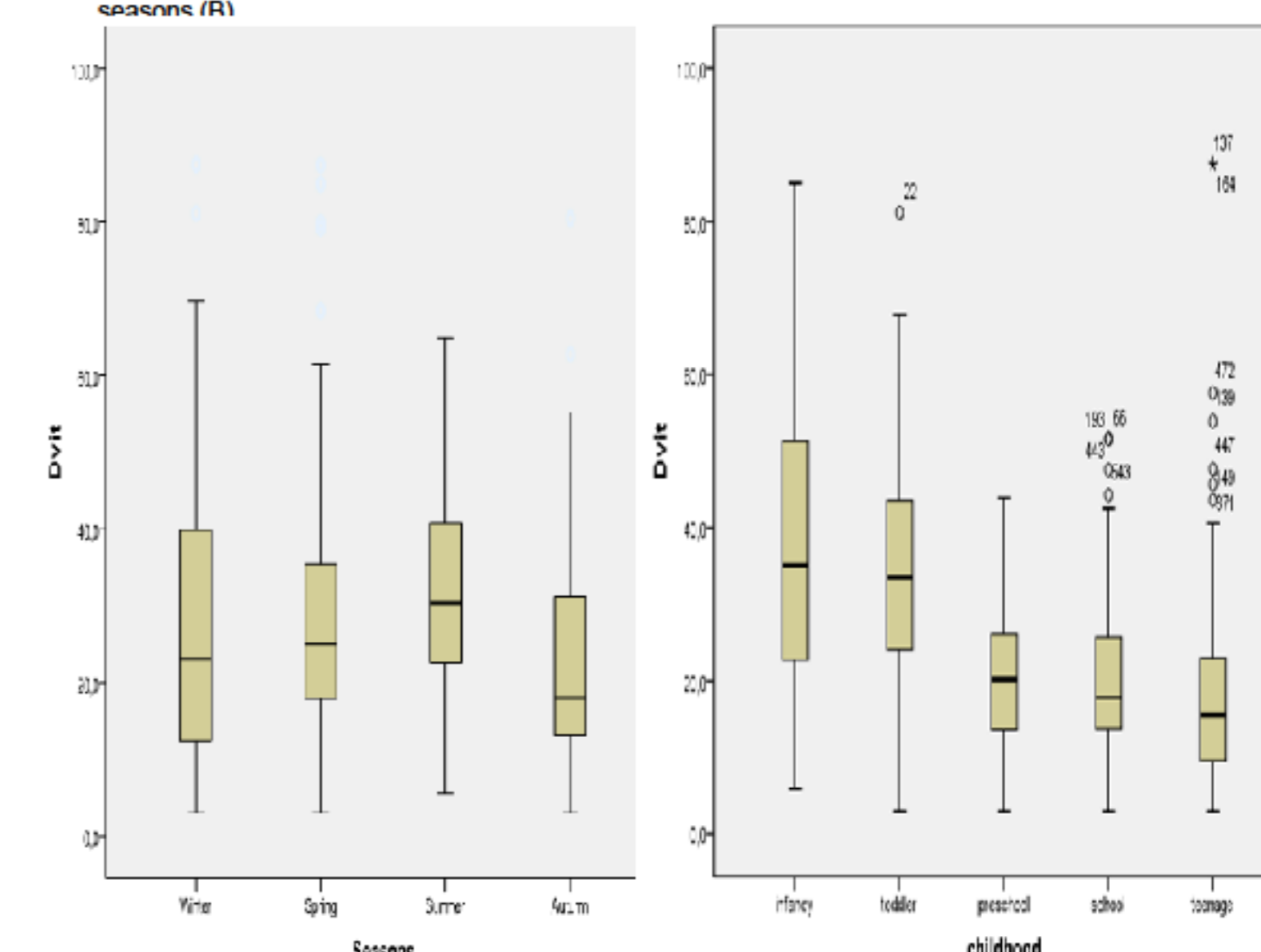
Table 1 Biochemical characteristics (mean±SD) and the prevalence of low serum 25(OH)D levels for male and female children by using 3 thresholds of 25(OH)D.

	Male n:253(%)	Female n:303(%)	P
Age(years)	4.82±5.38	7.47±6.52	<0.001
D vitamin levels±SD ng/ml	28.71±15.67	25.96±16.01	<0.05
Calcium, mg/dL	9.96±0.98	10.01±0.69	0.587
Phosphorus, mg/dL	5.15±1.01	5.08±0.95	0.640
ALP, IU/L	255.79±183.83	242.80±288.79	<0.05
PTH, pg/ml	37.82±36.59	39.49±21.82	0.06
D vitamin levels -15 ng/ml n:140(25.1)	49 (19.2)	91 (30.0)	<0.05
D vitamin levels -20 ng/ml n:219(39.3)	82 (32.4)	137 (45.1)	<0.05
D vitamin levels -30 ng/ml n:353 (63.5)	153 (60.47)	200 (66.0)	0.134

Table 2 The prevalence of low serum vitamin D levels for childhood stages by using 3 thresholds of 25(OH)D.

Stages of Childhood n:556(%)	Infancy n:72(%)	Toddler n: 194 (%)	Preschool n: 54 (%)	School n: 87 (%)	Teenages n: 149 (%)	P
D vitamin levels±SD	38.74±18.00	34.02±14.51	21.05±9.76	21.24±11.07	18.49±13.27	<0.001
D vitamin levels<15 ng/ml n:140 (25.1)	3 (4.2)	17(8.7)	17(31.5)	33(37.9)	70 (47)	<0.001
D vitamin levels<20 ng/ml n:219 (39.3)	10 (13.8)	36 (18.5)	25 (46.2)	47 (54.0)	101 (67.7)	<0.001
D vitamin levels<30 ng/ml n:353 (63.5)	26 (37.1)	85 (43.8)	44 (81.4)	69 (79.3)	129 (86.5)	<0.001

Figure 1A,B Box plot of serum 25-OH-D levels according to the childhood stages (A) and the seasons (B).



## Discussion

This study showed that vitamin D deficiency and insufficiency in Turkey represent an ongoing and important public health issue, not only in infancy but in all childhood periods, with the highest prevalence seen during adolescence which is also a crucial period for the achievement of peak bone mass.

## Conclusion

Taking into consideration the positive effects of vitamin D on growing bones and non-bone health outcomes, it might be rational to speculate that the vitamin D supplementation started for newborns should be extended to children of all ages, and that routine screening and supplementation should be provided to prevent vitamin D deficiency in at-risk groups during winter and autumn months, when vitamin D synthesis is scarce.

