

Are Caucasian children at risk of sub-optimal vitamin D levels?

Bone, growth plate and mineral metabolism

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1. Background

In children, vitamin D insufficiency has been linked to osteopenia and osteoporosis (1). Studies also suggest a negative correlation between vitamin D levels and diabetes mellitus types I and 2, and cardiovascular diseases (2).

2. Aim

To identify the vitamin D levels in a select cohort of Caucasian children aged 0-16 years, and identify the effect of age group, weight, preterm birth and malabsorptive conditions.

3. Methods

- Electronic patient records of all children (368) aged 0-16 who had a vitamin D test at Royal Cornwall Hospital between February and September 2017 were collected.
- Repeat tests, inadequate samples and non-Caucasian ethnicities were excluded
- 314 results were screened for demographics, risk factors and vitamin D status.
- Vitamin D levels were deficient: <25 nmol/l, insufficient: 25-50 nmol/l and sub-optimal: 50-75 nmol/l. (3)

4. Results and Conclusions

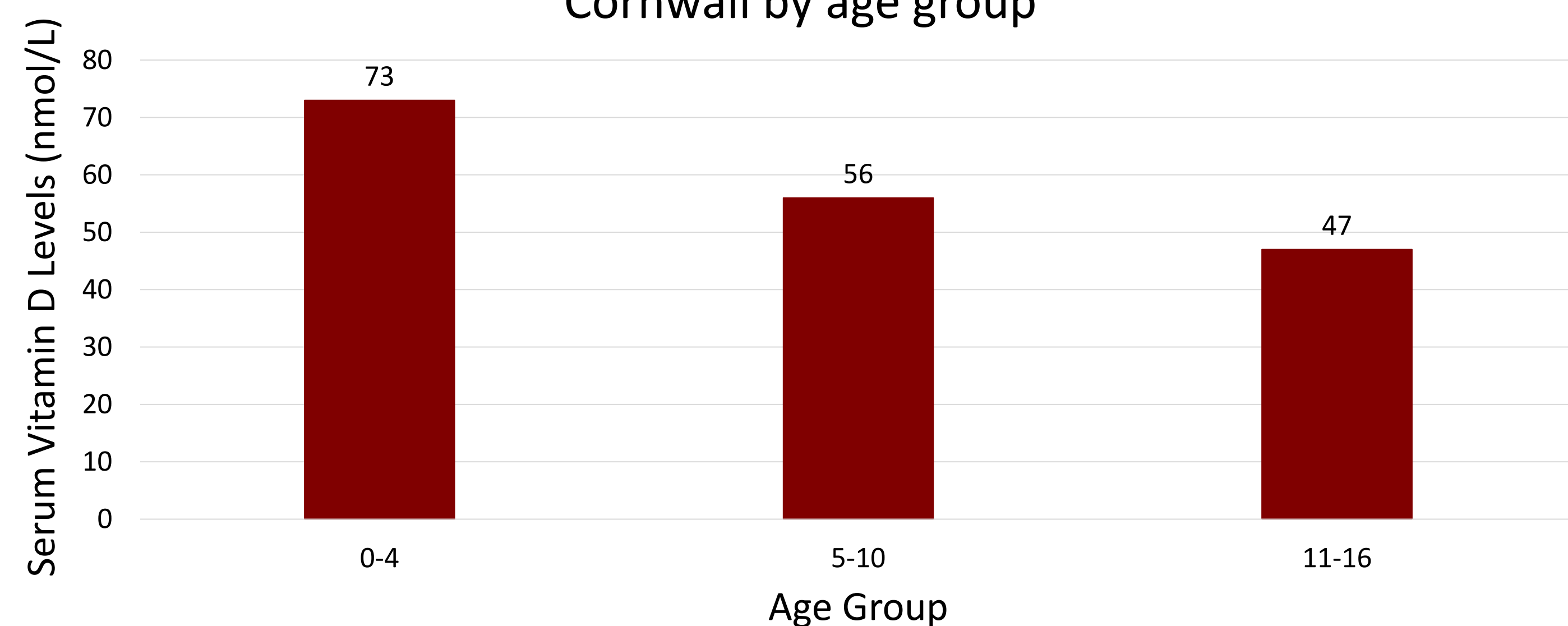
The prevalence of sub-optimal vitamin D levels or lower was 75.19% and prevalence of insufficient levels or lower was 40.46%.

- Despite the data being collected over summer, the prevalence was higher than previously recorded (4).
- The cohort may have a higher baseline risk of sub-optimal levels as they were obtained from secondary care.

Age Group

- Median vitamin D levels across all age groups were sub-optimal and the 11-16 group was at risk of insufficiency.
- Medians were compared because of a positive skew in data distribution (Fig. 1).
- Statistical analysis found significant difference between vitamin D levels of the three age groups ($p < 0.001$).
- The 0-4 group have access to fortified formula milk and free vitamins.
- The older groups may have reduced outdoor activity and low adherence to prescription supplements.

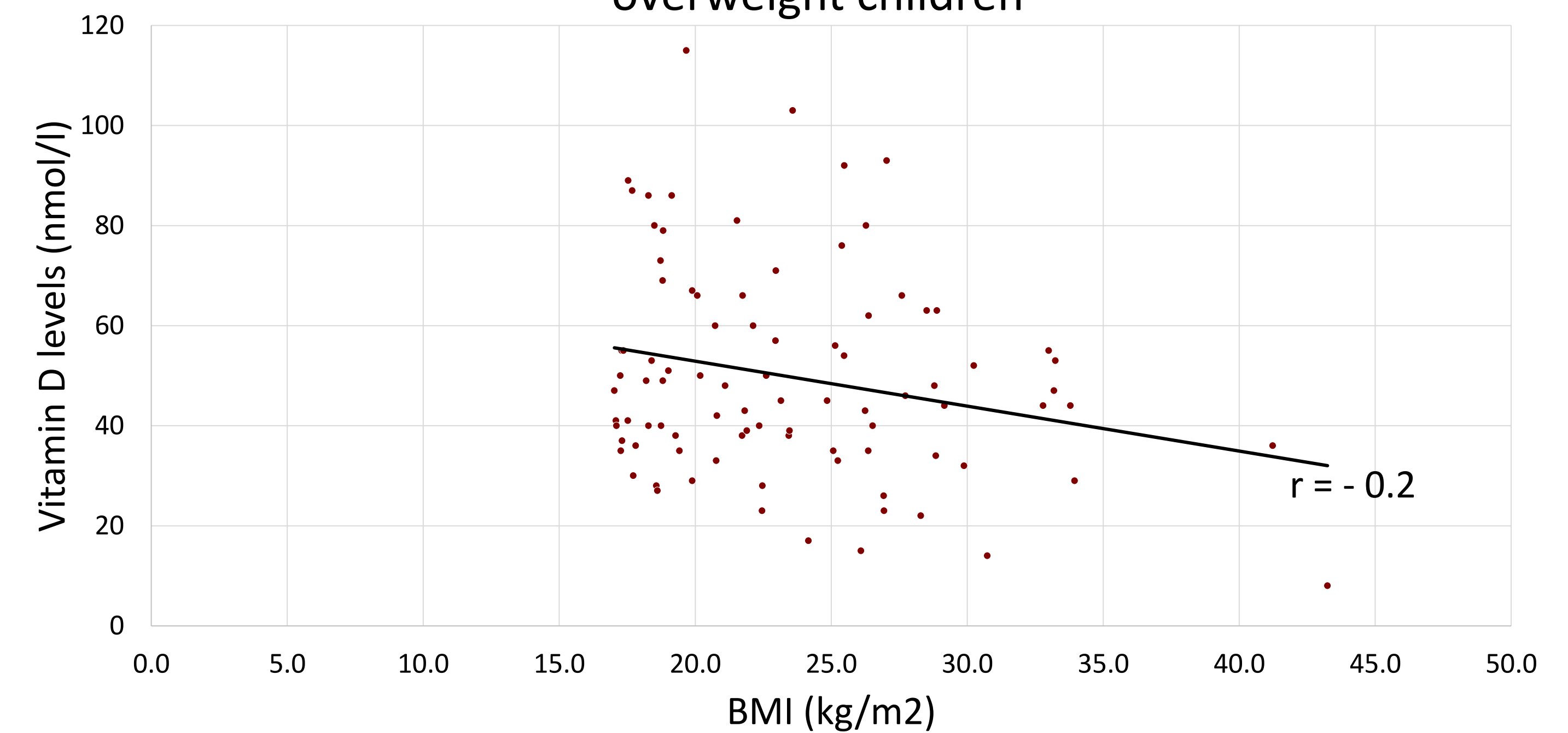
Fig. 1: Median vitamin D levels of Caucasian children in Cornwall by age group



Weight

Our data suggests that overweight children are at a slightly higher risk of lower vitamin D levels with a negative correlation of -0.2 (Fig.2).

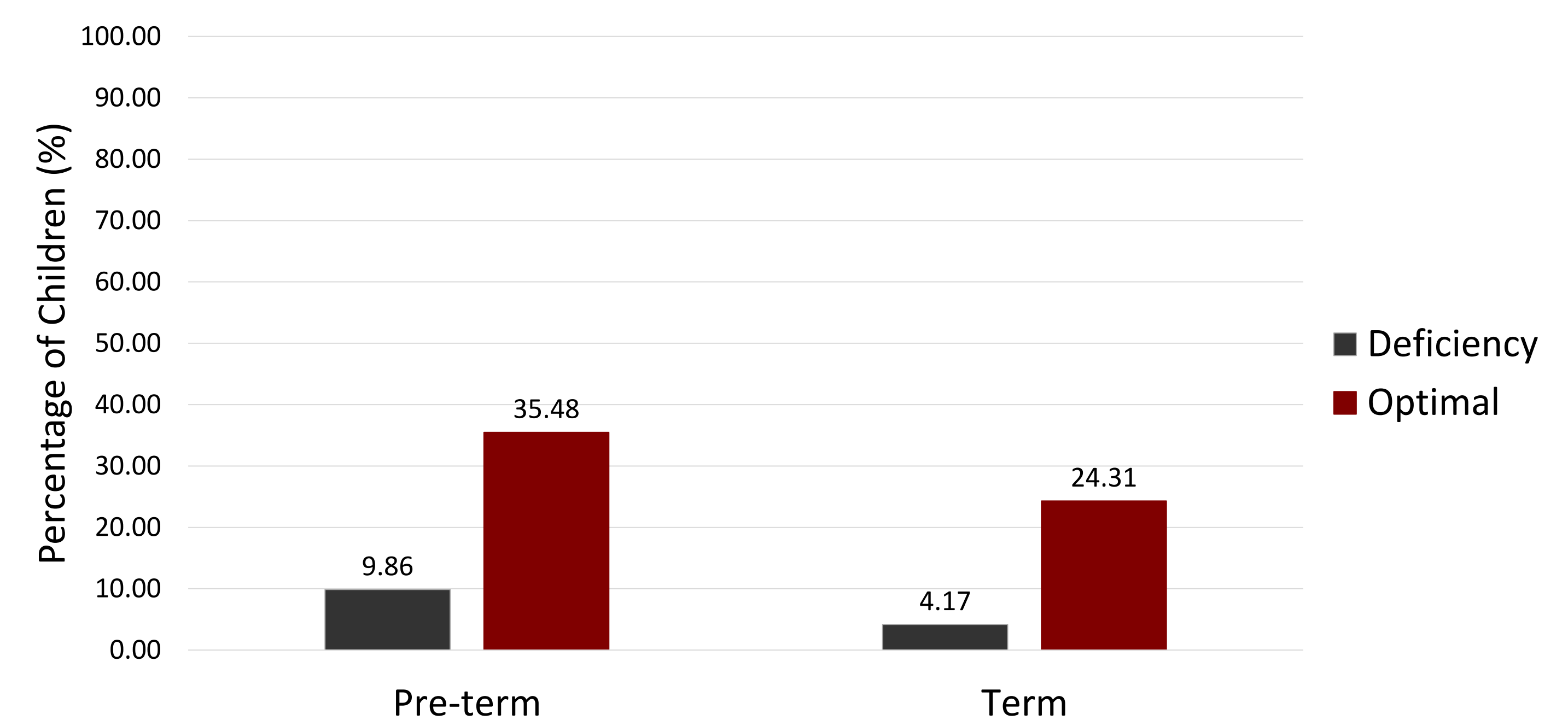
Fig.2: The correlation between BMI and Vitamin D levels in overweight children



Pre-term birth

- There is a higher prevalence of both vitamin D deficiency and optimal vitamin D levels in children born pre-term (Fig.3).
- Similar socio-economic risk factors predispose to pre-term birth and vitamin D deficiency. (5)
- Adherence to supplementation and routine follow-ups for some pre-term infants may account for the optimal levels.

Fig. 3: A comparison between vitamin D levels in pre-term and term children



Malabsorptive Conditions

- No significant correlation between vitamin D levels and malabsorptive conditions. The sample sizes were too small to identify the effect of most individual conditions.
- A high prevalence of sub-optimal levels or lower (82.35%) was found in children with cystic fibrosis in spite of supplementation being indicated.

5. Recommendations

Supplementation should be extended to at risk groups like adolescents and overweight children. We encourage routine follow-ups in pre-term children, especially in lower socio-economic group, and children with malabsorptive conditions like cystic fibrosis. Doctors should be more aware of vitamin D status in Caucasian children.

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References:

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