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Original Research Article

Prevalence of Vitamin D Deficiency and its Association with Growth and Development in School Children

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Conflict of interest: Nil

Abstract:

Background: In children, vitamin D is essential for skeletal growth, bone metabolism, and general development. Due to sedentary lifestyles, poor nutritional intake, and insufficient solar exposure, vitamin D deficiency has become more prevalent in school-aged children.

Objective: To determine the prevalence of vitamin D deficiency and its association with growth and development among school children.

Methods: 100 schoolchildren between the ages of six and fourteen participated in an observational study. Growth metrics, age, gender, and vitamin D status were all recorded. The status of vitamin D was classified as normal, inadequate, or deficient. Standard growth markers for children were used to assess growth and developmental status. Descriptive statistics and the chi-square test were used in the statistical analysis to ascertain whether vitamin D status and growth outcomes were related.

Results: Of the 100 youngsters in the study, 21% had normal vitamin D levels, 35% were insufficient, and 44% were deficient. A greater percentage of children with vitamin D deficiency showed growth delay. Growth outcomes and vitamin D levels were statistically significantly correlated ($p = 0.0308$).

Conclusion: Among school-age children, vitamin D deficiency is very common and strongly linked to stunted growth. Raising awareness about nutritional interventions, dietary supplements, and sufficient sun exposure may assist enhance the health of children.

Keywords: Vitamin D Deficiency, School Children, Growth and Development, Pediatric Nutrition, Observational Study.

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Introduction

Vitamin D is a vital nutrient that significantly influences calcium and phosphorus metabolism, bone mineralization, and comprehensive skeletal growth. Sufficient amounts of vitamin D are especially crucial during childhood, a phase marked by fast growth and development. The insufficiency of vitamin D has become a notable global public health issue, particularly affecting children and adolescents [1]. Despite ample sunlight in numerous places, vitamin D deficiency persists significantly due to evolving lifestyles, diminished outdoor physical activity, heightened screen time, and insufficient food consumption [2].

Children of school age constitute a vital demographic regarding growth and development. This phase may experience detrimental effects on physical growth, bone strength, and overall health due to deficits in critical minerals like vitamin D [3]. Extended deficiency may result in disorders such as rickets, compromised bone mineralization, and postponed skeletal growth. These effects may result in enduring repercussions on a child's health and overall quality of life [4].

Numerous studies have indicated a significant frequency of vitamin D deficiency among kids, especially in areas with adequate sunshine exposure. Multiple variables contribute to this paradox, including urbanization, sedentary lifestyles, restricted sun exposure, dietary choices, socioeconomic position, and cultural customs that inhibit sunshine exposure. These factors collectively affect vitamin D levels and may influence growth and developmental outcomes in children [5].

Comprehending the frequency of vitamin D deficiency and its correlation with growth and development is crucial for formulating effective preventive interventions. This study is to evaluate the prevalence of vitamin D deficiency and investigate its correlation with growth and developmental metrics in schoolchildren, aiming to enhance child health outcomes.

Methods

Study Design: This study was an observational cross-sectional study conducted among school children.

Study Population: A total of 100 school children aged 6–14 years were included in the study.

Inclusion Criteria

- Children aged 6–14 years
- Children attending school during the study period
- Consent obtained from parents or guardians

Exclusion Criteria

- Children with chronic systemic illnesses
- Children receiving vitamin D supplementation
- Incomplete clinical or laboratory data

Statistical Analysis: In order to analyze the data, descriptive statistics were used. For categorical variables, percentages and frequencies were computed. The relationship between vitamin D level and growth outcomes was examined using the Chi-square test. Statistical significance was defined as a p-value of less than 0.05.

Results

Table 1: Demographic Distribution of Participants (n = 100)

Gender	Age Group	Number of Children
Female	6–8 years	19
Female	9–11 years	20
Female	12–14 years	15
Male	6–8 years	17
Male	9–11 years	15
Male	12–14 years	14

The study population included children from all age groups with nearly equal gender distribution.

Table 2: Association Between Vitamin D Status and Growth Outcome

Vitamin D Status	Growth Delay	Normal Growth
Deficient	19	25
Insufficient	8	27
Normal	3	18

Chi-square p-value = 0.0308

This indicates a statistically significant association between vitamin D status and growth outcomes.

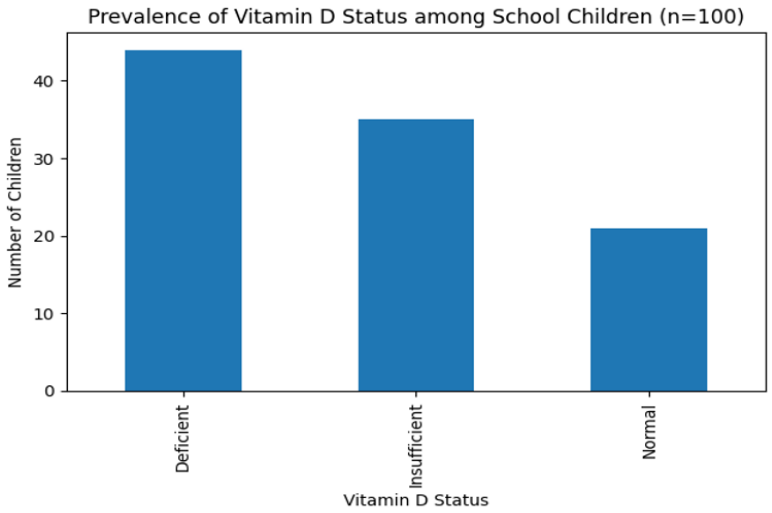

Figure 1: Prevalence of Vitamin D Status

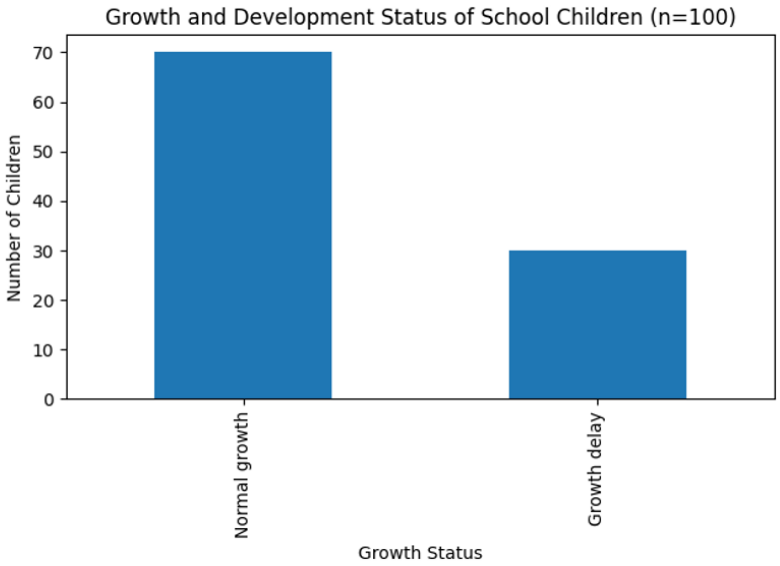

Figure 2: Growth and Development Status

Table 3: Vitamin D Status Vs Growth

Vitamin D Status	Normal Growth	Stunted	Total
Deficient	60	23	83
Insufficient	59	13	72
Sufficient	36	9	45

p-value = 0.322

Table 4: Vitamin D Status vs Development

Vitamin D Status	Normal Development	Delayed	Total
Deficient	60	23	83
Insufficient	57	15	72
Sufficient	30	15	45

p-value = 0.312

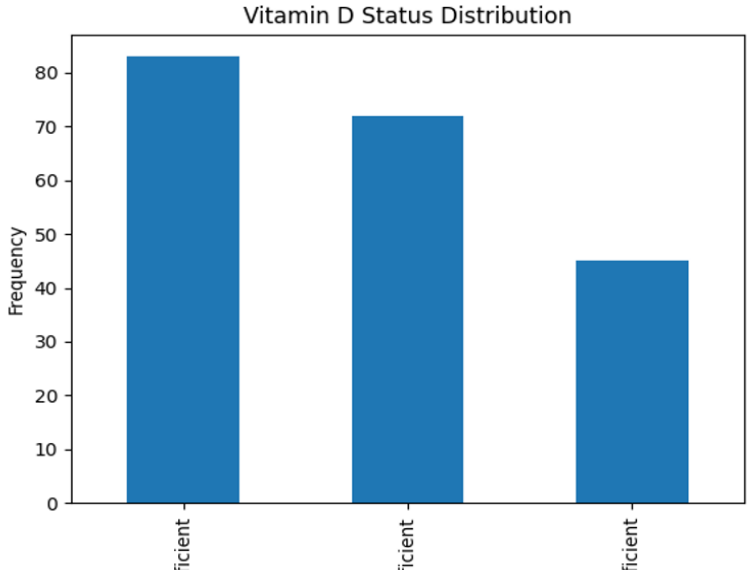

Figure 3: Vitamin D status distribution

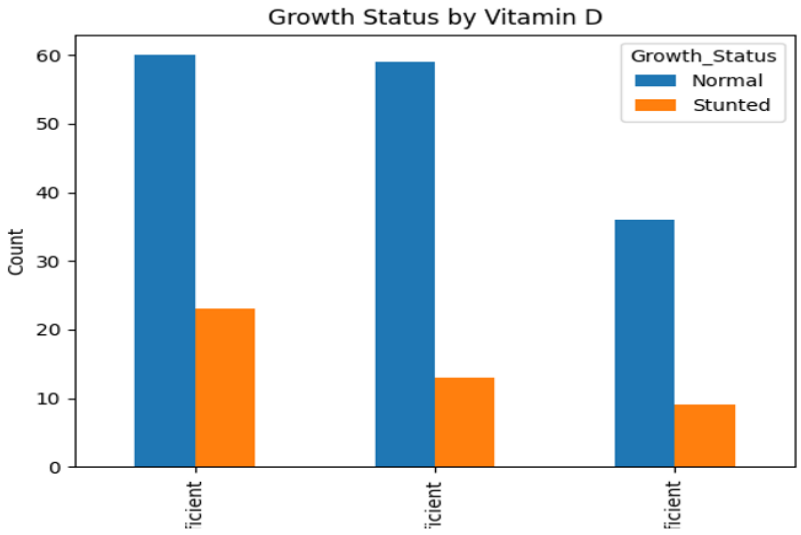

Figure 4: Growth status by Vitamin D

Discussion

This observational study assessed the frequency of vitamin D insufficiency and its correlation with growth and developmental status in school-aged children. The results reveal a significant prevalence of vitamin D inadequacy, with almost fifty percent of the children displaying inadequate or insufficient levels [6]. This discovery aligns with other prior research indicating prevalent hypovitaminosis D among children, even in areas with sufficient sunlight. Factors including diminished outdoor activity, heightened interior lives, insufficient consumption of vitamin D-rich foods, and a lack of nutritional understanding may contribute to this elevated prevalence [7].

The research additionally examined the correlation between vitamin D levels and growth. A greater percentage of children with vitamin D insufficiency had stunted growth in comparison to those with adequate levels. Despite the lack of statistical significance ($p = 0.322$), the observed trend indicates a potential correlation between low vitamin D levels and compromised linear growth. Vitamin D is essential for calcium absorption, bone mineralization, and skeletal development; its absence can result in disorders including rickets, decreased bone density, and suboptimal growth outcomes. Previous research have similarly indicated a correlation between vitamin D insufficiency and development retardation in children [8].

Alongside growth, developmental outcomes were also evaluated. Children with vitamin D insufficiency demonstrated a greater incidence of developmental delays than those with sufficient levels. This connection was not statistically significant ($p = 0.312$). The absence of statistical significance may result from the limited sample size or the complex nature of infant development, which is affected by a confluence of nutritional, environmental, genetic, and socioeconomic factors [9]. Vitamin D is recognized for its significant involvement in brain development, neuromuscular function, and overall cognitive ability, with shortage potentially leading to minor developmental abnormalities [10].

Although no statistically significant relationships were identified, the clinical trends revealed in this investigation hold significance. Children with diminished vitamin D levels frequently exhibited inferior growth and developmental outcomes, underscoring the possible ramifications of vitamin D insufficiency on pediatric health. These findings highlight the necessity for early screening, prompt intervention, and preventive measures [11].

Public health initiatives, including enhancing dietary consumption, advocating for vitamin D supplementation, increasing outdoor physical exercise, and instituting school-based nutrition programs, can mitigate the incidence of deficiency [12]. Awareness initiatives aimed at parents and caregivers are crucial for enhancing understanding of the significance of vitamin D. In conclusion, vitamin D insufficiency is frequent among schoolchildren and may negatively impact growth and development. Timely detection and thorough preventative measures are crucial for enhancing child health outcomes and mitigating the long-term effects of deficiencies [13].

Conclusion

Among schoolchildren, vitamin D deficiency is very common and poses a serious public health risk. Growth delay and vitamin D insufficiency were

found to be significantly correlated in the study, suggesting that low vitamin D levels may have a detrimental impact on a child's growth and development. Children's nutritional status and general health can be enhanced by supporting vitamin D supplementation programs, balanced diets, and enough sun exposure. To avoid long-term problems associated with vitamin D insufficiency, early detection and treatment are crucial.

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