Original Article

DOI: 10.7860/JCDR/2026/89903.24655

Paediatrics Section

Sociodemographic Factors and Supplementation Practices Associated with Hypovitaminosis D in Infants: A Prospective Observational Study

RICHA BHATT[1], JAGRUTI RATHVA[2], SHILVI SHAH[3], URVISH JOSHI[4], HALAK VASAVADA[5], VAIDEHI GODBOLE[6], PANKTI DESAI[7], AADYA VYAS[8]

BY-NC-ND

ABSTRACT

Introduction: Vitamin D deficiency remains highly prevalent among infants in low- and middle-income countries. Maternal health-seeking behaviour, urbanisation, and seasonal variations are emerging as key factors associated with infant vitamin D status. However, hospital-based data evaluating adjusted associations among these factors and infant vitamin D status remain scarce.

Aim: To determine the prevalence of hypovitaminosis D among hospitalised infants and identify sociodemographic and supplementation-related practices independently associated with the deficiency.

Materials and Methods: A hospital-based prospective observational study was conducted in the Department of Paediatrics at Narendra Modi Medical College, LG Hospital in Ahmedabad, Gujarat, India, from July 2023 to December 2024. The study was conducted among 183 hospitalised infants (1-12 months) with acute medical illnesses. Sociodemographic variables, seasonal admission, maternal/infant supplementation practices, feeding types, and nutritional status were recorded. For the present study, hypovitaminosis D was operationally defined as serum 25-hydroxyvitamin D [25(OH)D] concentration <20 ng/mL. Univariate analyses and multivariable binary logistic regression were performed to calculate Unadjusted Odds Ratios (UOR) and Adjusted Odds Ratios (AOR) with 95% Confidence Intervals (CI). A p-value <0.05 was considered statistically significant.

Results: The cohort comprised 183 infants (mean age 5.4±3.2 months; 63.9% male). The prevalence of hypovitaminosis D was 54.1%. In unadjusted analyses, urban residence, lower Socioeconomic Status (SES), winter season, and low parental education were significantly associated with deficiency (p<0.05). In multivariable binary logistic regression, the lack of maternal antenatal supplementation (AOR 2.95; 95% CI 1.40–6.10, p=0.004) and lack of infant supplementation (AOR 4.00; 95% CI 2.00-8.15, p=0.0001) demonstrated statistically significant independent associations with deficiency. Infants presenting with acute respiratory infections had higher unadjusted odds of hypovitaminosis D than those with non respiratory diagnoses (UOR 2.55; 95% CI 1.40–4.64; p=0.002).

Conclusion: Hypovitaminosis D was highly prevalent among hospitalised infants. Lack of maternal and infant supplementation showed the strongest adjusted associations with hypovitaminosis D. These findings should be interpreted within the hospital-based observational design.

Keywords: Health-seeking behaviour, Infant nutrition, Respiratory infections, Social determinants of health, Urbanisation, Vitamin D deficiency

INTRODUCTION

Vitamin D deficiency remains a significant global public health concern, particularly among infants and young children [1]. Despite abundant sunlight exposure, disproportionately high prevalence rates (ranging from 40% to 70%) have been reported in India and other tropical regions, highlighting a paradox of widespread hypovitaminosis D in sun-rich environments [1-3]. This burden is of particular concern in hospitalised infants (tertiary care setting), where underlying acute illnesses and nutritional vulnerabilities may further compound the effects of deficiency [3].

Vitamin D plays a crucial role in calcium-phosphate homeostasis, and its severe deficiency is associated with rickets and impaired growth [4]. Beyond its classical skeletal functions, vitamin D exerts important immunomodulatory effects, specifically enhancing innate immunity via the induction of antimicrobial peptides like cathelicidin [5]. Emerging epidemiological evidence indicates a potential association between vitamin D deficiency and increased risk or severity of acute respiratory infections in early childhood [6,7].

Multiple systemic determinants contribute to hypovitaminosis D in infancy. Urbanisation has emerged as a key factor; urban populations experience increased indoor lifestyles, structural housing barriers, and environmental pollution, which collectively limit effective Ultraviolet B (UVB) exposure [3,8]. Furthermore, infants born to deficient mothers are at increased risk of early-life deficiency, especially in settings where postnatal infant supplementation is inconsistently practised [9]. Sociodemographic variables such as low SES, limited parental education, and seasonal variations (e.g., reduced sunlight in winter) further compound this risk [8].

Despite growing recognition of these social determinants, limited hospital-based data remain on adjusted associations between these factors and infant vitamin D status in the Indian context. Therefore, the present study was undertaken to evaluate the sociodemographic, seasonal, and programmatic factors associated with hypovitaminosis D among hospitalised infants. Identifying these specific public health gaps may help inform targeted, evidence-based interventions. By using multivariable binary logistic regression in a tertiary care setting, the present study aimed to bridge the gap between community prevalence and acute clinical presentations, providing targeted evidence to enhance existing preventive supplementation protocols. The objectives were to determine the

prevalence of hypovitaminosis D among hospitalised infants and to identify sociodemographic and supplementation-related practices independently associated with the deficiency.

MATERIALS AND METHODS

A hospital-based prospective observational study was conducted in the Department of Paediatrics at Narendra Modi Medical College, LG Hospital, Ahmedabad, Gujarat, India, from July 2023 to December 2024. The study protocol was approved by the Institutional Review Board (Approval No: NaMoMC/IRB/2023/Dissertation/41). Written informed consent was obtained from parents/guardians before enrollment, in strict accordance with the Declaration of Helsinki (2013). The study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [10].

Inclusion criteria: Infants aged 1-12 months hospitalised for acute medical illnesses, irrespective of severity, whose parents provided written informed consent were included.

Exclusion criteria: Infants receiving therapeutic vitamin D supplementation before admission, those with chronic systemic illness, metabolic bone disease, or congenital anomalies affecting growth were excluded.

Sample size calculation: A consecutive sample of 183 infants aged 1-12 months admitted was included. In the absence of a stable local prevalence estimate, an expected prevalence of 50% was used because it maximises P (1-P) and provides the most conservative sample-size estimate. At a 95% confidence level and 7.5% absolute precision, the minimum required sample was 171. The 99 deficient cases also provided approximately 10 events per variable for the selected covariates in the multivariable model [11].

Study Procedure

Data were collected using a pretested structured proforma from clinical records and caregiver interviews. Variables included were: Age was examined across four age categories-

1 to <3 months
3 to <6 months
6 to <9 months
9-12 months

Gender was summarised descriptively and was not treated as a candidate explanatory exposure because the study did not evaluate a gender-specific association.

- **Sociodemographic factors:** Residence (urban/rural), Religion, SES (Modified Kuppuswamy Classification, 2024, [12] using education, occupation, and family income scores), and parental education.
- **Environmental/Dietary factors:** Season of admission (Winter, Summer, Monsoon) and primary feeding type (Exclusive breastfeeding vs. Formula).
- **Programmatic practices:** Maternal antenatal vitamin D/ calcium supplementation (self-reported; Yes/No; dose not quantified) and infant vitamin D supplementation (self-reported; Yes/No; dose not quantified). Supplementation exposure was dichotomised due to the inability to reliably quantify duration or adherence.
- **Nutritional status:** Weight-For-Age (WFA) was evaluated using World Health Organisation (WHO 2006) growth standards, with underweight defined as a Z-score of ≤ -2 standard deviations [13].
- **Clinical morbidity:** Primary admission diagnosis based on WHO Integrated Management of Neonatal and Childhood Illness (IMNCI) criteria (WHO, 2014) (Acute Respiratory Infections, Gastrointestinal Infections, Acute Febrile Illness) [14].

Laboratory assessment: Serum 25-hydroxyvitamin D {25(OH) D} using the Abbott ARCHITECT chemiluminescent microparticle immunoassay (CMIA) analyser, calibrated with Abbott Architect calibrators, following the manufacturer's protocol (intra-assay coefficient of variation: 0.4%) Deficiency was defined as <20 ng/mL, while levels ≥20 ng/mL were categorised as sufficient [15].

STATISTICAL ANALYSIS

Data analysis was performed using the Statistical Package for Social Sciences (SPSS) statistics version 26.0 (IBM Corp., Armonk, NY, USA) [16]. There were no missing data in the final dataset analysed. Categorical variables were expressed as frequencies and percentages. Group comparisons were conducted using appropriate non-parametric and parametric tests, primarily the Chi-square test or Fisher's-exact test. To partially control for measured confounding, variables with $p<0.10$ in the univariate analysis and clinically relevant covariates were entered into a multivariable binary logistic regression model (with vitamin D deficiency as the dependent variable) to identify independently associated factors. Season of admission was entered as a three-level categorical variable (Winter, Monsoon, Summer), with Summer, which had the lowest unadjusted deficient proportion, specified a priori as the reference category. Clinical morbidity was examined only in bivariate analysis [Table/Fig-3] and was not entered into the multivariable model, because acute illness can transiently alter serum 25(OH)D through an inflammatory response, as discussed under Limitations. Results are reported as UORs and AORs, with 95% CIs. A p-value <0.05 was considered statistically significant. Model adequacy was assessed using the Hosmer-Lemeshow goodness-of-fit test. The discriminative ability of the model was evaluated using the Area Under the Receiver Operating Characteristic (AUROC) curve (AUC). Variance Inflation Factors (VIFs) were calculated to assess multicollinearity among the independent variables.

RESULTS

A total of 183 hospitalised infants were included via consecutive sampling. The overall prevalence of hypovitaminosis D (<20 ng/mL) in the cohort was 99 (54.1%).

Baseline characteristics of the study population are summarised in [Table/Fig-1]. The cohort was predominantly male 117 (63.9%) and urban 153 (83.6%), with a high proportion belonging to the lower socioeconomic stratum 110 (60.1%). Preventive health-seeking practices were notably suboptimal; 117 (63.9%) of mothers lacked antenatal supplementation, and 105 (57.4%) of infants were not receiving postnatal vitamin D supplementation.

Variables	Category	n (%)
Age group	1 to <3 months	50 (27.3%)
	3 to <6 months	59 (32.2%)
	6 to <9 months	39 (21.3%)
	9-12 months	35 (19.1%)
Gender	Male	117 (63.9%)
	Female	66 (36.1%)
Residence	Urban	153 (83.6%)
	Rural	30 (16.4%)
Religion	Hindu	97 (53.0%)
	Muslim	86 (47.0%)
Socioeconomic Status (SES)	Lower	110 (60.1%)
	Lower Middle	69 (37.7%)
	Upper/Upper Middle	4 (2.2%)
Parental education	Low	104 (56.8%)
	Medium	72 (39.3%)
	High	7 (3.8%)

Season of admission	Winter	91 (49.7%)
	Monsoon	50 (27.3%)
	Summer	42 (23.0%)
Feeding practice	Exclusively breastfed	98 (53.6%)
	Formula / Mixed	85 (46.4%)
Maternal antenatal supp.	Yes	66 (36.1%)
	No	117 (63.9%)
Infant vitamin D supp.	Yes	78 (42.6%)
	No	105 (57.4%)
Weight-For-Age (WFA) status	Normal	123 (67.2%)
	Underweight	60 (32.8%)

[Table/Fig-1]: Baseline characteristics of study population (N=183).

Mean serum 25(OH)D levels were 26.18±31.00, 19.31±13.16, 23.20±13.08 and 23.01±15.87 ng/mL among infants aged 1-3, 3-6, 6-9 and 9-12 months, respectively. The difference across age groups was not statistically significant (p=0.364). Age therefore did not meet the specified p<0.10 criterion for entry into the multivariable model.

Univariate analyses revealed significant associations between hypovitaminosis D and several sociodemographic and programmatic factors, as detailed in [Table/Fig-2]. Urban residence, lower SES and low parental education were associated with hypovitaminosis D (all p<0.05). Winter admissions had the highest deficient proportion (63.7%); the overall three-category season comparison was statistically significant (p=0.026). Lack of maternal and infant supplementation was associated with higher deficient proportions (both p<0.001). Feeding practice was not associated with vitamin D status (p=0.996).

Variables	Category	Deficient (<20 ng/mL) n (%)	Sufficient (≥20 ng/mL) n (%)	Total N	p-value
Residence	Urban	88 (57.5%)	65 (42.5%)	153	0.036*
	Rural	11 (36.7%)	19 (63.3%)	30	
Religion	Hindu	45 (46.4%)	52 (53.6%)	97	0.026*
	Muslim	54 (62.8%)	32 (37.2%)	86	
Socioeconomic Status (SES)	Lower	67 (60.9%)	43 (39.1%)	110	0.023*
	Middle/Upper	32 (43.8%)	41 (56.2%)	73	
Parental education	Low	66 (63.5%)	38 (36.5%)	104	0.004*
	Medium/High	33 (41.8%)	46 (58.2%)	79	
Season of admission	Winter	58 (63.7%)	33 (36.3%)	91	0.026*
	Monsoon	24 (48.0%)	26 (52.0%)	50	
	Summer	17 (40.5%)	25 (59.5%)	42	
Feeding practice	Excl. breastfed	53 (54.1%)	45 (45.9%)	98	0.996
	Formula/Mixed	46 (54.1%)	39 (45.9%)	85	
Maternal supp.	Yes	22 (33.3%)	44 (66.7%)	66	<0.001*
	No	77 (65.8%)	40 (34.2%)	117	
Infant supp.	Yes	24 (30.8%)	54 (69.2%)	78	<0.001*
	No	75 (71.4%)	30 (28.6%)	105	
Weight-For-Age (WFA)	Normal	57 (46.3%)	66 (53.7%)	123	0.003*
	Underweight	42 (70.0%)	18 (30.0%)	60	

[Table/Fig-2]: Sociodemographic factors and bivariate analysis of Vitamin D status (N=183).

Percentages were calculated within each category row. Pearson's Chi-square test was used. The season p-value represents the overall three-category comparison. SES: socioeconomic status; *p<0.05. For inferential analysis, lower middle and upper/upper middle SES were combined as middle/upper (n=73), while medium and high parental education were combined as medium/high (n=79); [Table/Fig-1] retains the original descriptive categories.

Primary clinical presentation at admission also varied significantly based on vitamin D status [Table/Fig-3]. Acute respiratory infections had the highest proportion. Compared with infants admitted for non-respiratory diagnoses, those with acute respiratory infections had higher unadjusted odds of hypovitaminosis D (UOR 2.55; 95% CI 1.40-4.64; p=0.002).

Clinical morbidity	Deficient n (%)	Sufficient n (%)	UOR (95% CI)	p-value
Acute respiratory infections	65 (64.4%)	36 (35.6%)	2.55 (1.40-4.64)	0.002*
Gastrointestinal infections	14 (35.9%)	25 (64.1%)	0.39 (0.19-0.81)	0.010*
Acute febrile illness	20 (46.5%)	23 (53.5%)	0.67 (0.34-1.33)	0.254

[Table/Fig-3]: Association of clinical morbidity with Vitamin D status.

Each UOR compares the stated morbidity category with the other two diagnosis categories combined; hypovitaminosis D is the outcome. UORs and Wald 95% CIs were calculated from the displayed 2×2 cells, and p-values are from Pearson's Chi-square test. Percentages were calculated within morbidity rows. UOR: Unadjusted odds ratio; CI: Confidence interval; *p<0.05.

Multivariable Analysis

Clinical morbidity, including acute respiratory infections, was defined using IMNCI criteria, as described in the Methods [14]. To partially adjust for potential confounders, variables were included in a multivariable binary logistic regression model [Table/Fig-4]. The multivariable binary logistic regression model demonstrated good fit (Hosmer-Lemeshow test p=0.42). The discriminative ability of the model was acceptable, with an AUC of 0.76. All VIF values were below 1.5, indicating that the included predictors were not strongly correlated and that important multicollinearity was unlikely.

Variables	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	p-value (Adj)
Maternal Supp. (No vs Yes)	3.85 (2.03-7.29)	2.95 (1.40-6.10)	0.004*
Infant Supp. (No vs Yes)	5.63 (2.96-10.68)	4.00 (2.00-8.15)	0.0001*
Season (Winter vs Summer)†	2.58 (1.22-5.47)	2.35 (1.10-5.15)	0.021*
Weight-For-Age (WFA) (Underweight)	2.70 (1.40-5.21)	2.25 (1.10-4.60)	0.025*
Parental education (Low)	2.42 (1.33-4.41)	2.07 (1.04-4.13)	0.038*
SES (Lower)	2.00 (1.10-3.64)	1.85 (0.95-3.60)	0.07
Religion (Muslim)	1.95 (1.08-3.52)	1.65 (0.90-3.10)	0.09
Residence (Urban)	2.34 (1.04-5.25)	1.55 (0.75-3.25)	0.22

[Table/Fig-4]: Multivariable binary logistic regression of factors associated with hypovitaminosis D.
†Season was modelled as a three-level categorical variable (reference: Summer). The Monsoon vs Summer contrast was not statistically significant and is not tabulated.

After adjustment, the lack of maternal and infant supplementation demonstrated statistically significant independent associations with hypovitaminosis D. Additionally, low parental education, winter season, and underweight status remained independently significant correlates.

DISCUSSION

The present study demonstrated a high prevalence (54.1%) of hypovitaminosis D among hospitalised infants. By employing multivariable modelling, the study evaluated adjusted associations between sociodemographic, nutritional and supplementation-related factors and infant vitamin D status. The crude associations for urban residence and religion were attenuated after adjustment. Measured socioeconomic, educational and seasonal factors may partly account for these differences. Winter admission remained associated with hypovitaminosis D after adjustment (AOR 2.35), which may relate to reduced UVB-dependent cutaneous synthesis during colder months [8,17].

The strongest adjusted associations were observed for lack of maternal antenatal supplementation (AOR 2.95) and lack of infant

supplementation (AOR 4.00). The lower deficient proportion among infants of supplemented mothers is consistent with evidence that maternal supplementation may support neonatal vitamin D stores [9,18]. Feeding type was not associated with deficiency in the present study cohort, supporting existing literature that breastmilk alone may be insufficient in maintaining adequate vitamin D levels without concurrent systemic supplementation [9].

Low parental education also remained associated with hypovitaminosis D after adjustment (AOR 2.07; 95% CI 1.04–4.13; p=0.038). This association may reflect differences in awareness of or access to preventive supplementation. The adjusted association between underweight status WFA and hypovitaminosis D (AOR 2.25) may reflect coexistence with undernutrition [19]. Acute respiratory infection was also associated with hypovitaminosis D in the unadjusted analysis (UOR 2.55; 95% CI 1.40-4.64; p=0.002). The study design precludes causal inference, but this exploratory finding is consistent with literature on the immunomodulatory role of vitamin D in respiratory defence [5,20].

Limitation(s)

However, findings are subject to limitations. First, as a hospital-based study, there is an inherent risk of selection bias; hospitalised infants may have higher baseline morbidities and may not be entirely representative of the broader healthy infant population. Findings indicate associations and do not imply causation. Residual confounding due to unmeasured variables, such as exact quantified sun exposure duration, specific dietary vitamin D intake, and maternal serum vitamin D levels, is acknowledged. Finally, the association with respiratory infections may be subject to reverse causality, where acute illness acutely lowers serum 25(OH)D levels. Specifically, inflammatory cytokines can downregulate the hepatic synthesis of vitamin D-binding protein and alter tissue distribution. Thus, lower levels observed in infants with acute respiratory infections may partially reflect an acute inflammatory response rather than baseline deficiency, limiting our ability to establish temporal causality. Gender-specific associations were not modelled. The male predominance and hospital-based sampling may limit the interpretation of potential gender-related differences.

Future multicentric longitudinal studies, using strict dose-quantification and serum biomarker tracking, are recommended to establish causal pathways and optimise supplementation guidelines.

CONCLUSION(S)

Over half of hospitalised infants in this cohort had hypovitaminosis D. Lack of maternal and infant supplementation, winter admission, underweight status and low parental education were independently associated with hypovitaminosis D after adjustment. These findings highlight the potential importance of antenatal and infant supplementation practices and support further evaluation of preventive supplementation strategies in appropriately designed longitudinal studies.

Future multicentric longitudinal studies, using strict dose-quantification and serum biomarker tracking, are recommended to establish causal pathways and optimise supplementation guidelines.

Authors contribution: HV: Corresponding author and editor; RB, SS and AV: Data collection; UJ: Study design, sample-size calculation and statistical analysis; JR and VG: Manuscript writing; PD: Manuscript overview and editing.

REFERENCES

[1] Korchia G, Amitai Y, Moshe G, Korchia L, Tenenbaum A, Rosenblum J, et al. Vitamin D deficiency in children in Jerusalem: The need for updating the recommendation for supplementation. Isr Med Assoc J. 2013;15(7):333-38.
[2] Cashman KD, Dowling KG, Škrabáková Z, Gonzalez-Gross M, Valtueña J, De Henauw S, et al. Vitamin D deficiency in Europe: Pandemic? Am J Clin Nutr. 2016;103(4):1033-44. Doi: 10.3945/ajcn.115.120873.
[3] Qureshi G, Khemissa M, Amr G, Bhat R. The non-conventional effects of hypovitaminosis D: A pandemic even in sunlight-rich countries. Cureus. 2024;16(4):e59267. Doi: 10.7759/cureus.59267.
[4] Turner AG, Anderson PH, Morris HA. Vitamin D and bone health. Scand J Clin Lab Invest. 2012;72(Suppl 243):65-72. Doi: 10.3109/00365513.2012.681963.
[5] Charoenngam N, Holick MF. Immunologic effects of vitamin D on human health and disease. Nutrients. 2020;12(7):2097. Doi: 10.3390/nu12072097.
[6] Umeadi EN, Echendu ST, Ufoaroh CU, Igwe WC, Ezeudu CE, Anyabolu EN, et al. Vitamin D and acute respiratory infections in children. Niger Med J. 2022;63(3):204-12. Doi: 10.60787/NMJ-63-3-134.
[7] Larkin A, Lassetter J. Vitamin D deficiency and acute lower respiratory infections in children younger than 5 years: Identification and treatment. J Pediatr Health Care. 2014;28(6):572-82. Doi: 10.1016/j.pedhc.2014.08.013.
[8] Roomi MA, Farooq A, Ullah E, Lone KP. Hypovitaminosis D and its association with lifestyle factors. Pak J Med Sci. 2015;31(5):1236-40. Doi: 10.12669/pjms.315.7196.
[9] Stoica AB, Mărginean C. The impact of Vitamin D deficiency on infants' health. Nutrients. 2023;15(20):4379. Doi: 10.3390/nu15204379.
[10] von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. BMJ. 2007;335(7624):806-08. Doi: 10.1136/bmj.39335.541782.AD.
[11] Bujang MA, Sa'at N, Sidik TMITAB, Joo LC. Sample size guidelines for logistic regression from observational studies with large population: Emphasis on the accuracy between statistics and parameters based on real life clinical data. Malays J Med Sci. 2018;25(4):122-30. Doi: 10.21315/mjms2018.25.4.12.
[12] Ahmad A, Faizi N, Siddiqui NA. Revised Prasad and Kuppuswamy socioeconomic scales for India in 2024: Methods and updates. Indian J Community Health. 2024;36(4):598-603. Doi: 10.47203/IJCH.2024.v36i04.015.
[13] World Health Organization. WHO child growth standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development. Geneva: World Health Organization; 2006.
[14] World Health Organization. Integrated management of childhood illness: Distance learning course. Geneva: World Health Organization; 2014.
[15] Mustafa A, Shekhar C. Concentration levels of serum 25-hydroxyvitamin-D and vitamin D deficiency among children and adolescents of India: A descriptive cross-sectional study. BMC Pediatr. 2021;21(1):334. Doi: 10.1186/s12887-021-02803-z.
[16] IBM Corp. (2019) IBM SPSS Statistics for Windows, Version 26.0. IBM Corp., Armonk.
[17] Bangle JF, Jennings WE, Guadagni AJ, Albino GR, Grundstein AJ, Wolf ST. Cutaneous microvascular function is reduced in winter compared with summer in healthy young adults. Physiol Rep. 2026;14(4):e70784. Doi: 10.14814/phy2.70784.
[18] Hollis BW, Wagner CL. New insights into the vitamin D requirements during pregnancy. Bone Res. 2017;5:17030. Doi: 10.1038/boneres.2017.30.
[19] Roth DE, Perumal N, Al Mahmud A, Baqui AH. Maternal vitamin D3 supplementation during the third trimester of pregnancy: Effects on infant growth in a longitudinal follow-up study in Bangladesh. J Pediatr. 2013;163(6):1605-11. e3. Doi: 10.1016/j.jpeds.2013.07.030.
[20] Nicolae M, Mihai CM, Chisnoiu T, Balasa AL, Frecus CE, Mihai L, et al. Immunomodulatory effects of vitamin D in respiratory tract infections and COVID-19 in children. Nutrients. 2023;15(15):3430. Doi: 10.3390/nu15153430.

PARTICULARS OF CONTRIBUTORS:
1. Senior Resident, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
2. Assistant Professor, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
3. Senior Resident, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
4. Associate Professor, Department of Community Medicine, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
5. Professor, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
6. Junior Resident, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
7. Professor, Department of Paediatrics, Narendra Modi Medical College, Ahmedabad, Gujarat, India.
8. Undergraduate Student, Department of Paediatrics, NHL Medical College, Ahmedabad, Gujarat, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Halak Vasavada,
96, Shardanagar Society, Vikas Gruh Road, Paldi, Ahmedabad 380007,
Gujarat, India.
E-mail: halakvasavada@yahoo.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: May 12, 2026
- Manual Googling: Aug 08, 2026
- iThenticate Software: Aug 10, 2026 (8%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Apr 20, 2026**
Date of Peer Review: **Jun 30, 2026**
Date of Acceptance: **Aug 12, 2026**
Date of Publishing: **Nov 01, 2026**