

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

Gayathri Gunasekaran^{1*}, Nalini Jayanthi Nagesh², Leela Kakithakara Vajravelu³, Vimalraj Vijayakumar⁴

^{1*}Research Scholar, Department of Microbiology, SRM Medical College Hospital and Research Centre, Kattankulathur-603203, Tamil Nadu, India. Corresponding Email: gayathri.microbiologist14@gmail.com

²Head of the Department, Department of Respiratory Medicine, SRM Medical College Hospital and Research Centre, Kattankulathur-603203, Tamil Nadu, India. Email: nalinijn@srmist.edu.in

³Head of the Department, Department of Microbiology, SRM Medical College Hospital and Research Centre, Kattankulathur-603203, Tamil Nadu, India. Email: leelav@srmist.edu.in

⁴Assistant Professor, Department of Paediatrics, SRM Medical College Hospital and Research Centre, Kattankulathur-603203, Tamil Nadu, India. Email: vimalrav@srmist.edu.in

ABSTRACT

Background: Vitamin D (Vit. D) is increasingly recognized for its part in immune modulation, particularly in respiratory infections (RIs). This work looked to gauge the association across Vit. D status and the severity and recovery of acute respiratory tract infections (ARTI) in children, focussing on inflammatory markers and the impact of supplementation.

Methods: In a cross-sectional design, 141 children aged 1–13 years presenting with ARTI were enrolled and classified into three groups: No Pneumonia (n=47), Pneumonia (n=47), and Severe Pneumonia (n=47). Serum 25(OH)D levels (lvl.s) were measured to configure Vit. D status (sufficient, insufficient, or deficient). Supplementation status, inflammatory markers (IL-6 and IL-8), and recovery time were recorded. Statistical analyses encompassed chi-square tests, t-tests, and Pearson correlation.

Results: Vit. D insufficiency was prevalent (63.1%), and significantly associated with increased ARTI severity ($p < 0.05$). Children with insufficient lvl.s had the highest rate of severe pneumonia (36%). Supplemented children exhibited significantly lower IL-6 and IL-8 lvl.s and recovered faster (mean = 3.11 days) compared to non-supplemented peers (mean = 12.02 days, $p < .001$). Strong negative correlations were observed between Vit. D lvl.s and IL-6 ($r = -0.884$) and IL-8 ($r = -0.780$).

Discussion: The findings indicate that even moderate Vit. D insufficiency increases ARTI severity in children, aligning with prior evidence that Vit. D modulates both innate and adaptive immune responses. Supplementation not only reduced inflammation but also significantly shortened recovery time, underscoring its potential role as an adjunctive therapy. However, given the cross-sectional design, causality cannot be confirmed, and further longitudinal studies are warranted.

Conclusion: Vit. D insufficiency is strongly associated with greater ARTI severity and slower recovery in children. Supplementation appears to significantly drop inflammation and accelerate recovery. These conclusions back the part of Vit. D in modulating immune responses in Paediatric RISS and highlight the potential benefits of supplementation in deficient populations.

Keywords: *Vit. D, Paediatric ARTI, Pneumonia, Inflammatory Markers, IL-6, IL-8, Supplementation, Recovery Time, Immune Response, RISS.*

How to cite this article: Gunasekaran G, Nagesh NJ, Vajravelu LK, Vijayakumar V. Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study. *Int J Drug Deliv Technol.* 2026;16(18s): 720-725. DOI: 10.25258/ijddt.16.18s.77

INTRODUCTION

Acute respiratory tract infections (ARTI) continue to be a major contributor to illness and death in children across the globe, particularly in those under the age of six, where the burden is most pronounced [1]. The interplay between nutritional status and immune function has garnered increasing attention, with Vit. D emerging as a critical modulator of both innate and adaptive immunity. Vit. D not

only supports bone health but also enhances the body's defense against respiratory pathogens through upregulation of antimicrobial peptides and modulation of inflammatory cytokine responses [2]. Recent systematic reviews and clinical studies have highlighted a noteworthy link across low Vit. D lvl.s and increased vulnerability to RISS in children. For instance, a 2023 systematic review discovered that children with Vit. D deficiency had a markedly higher

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

risk of developing RIs, with odds ratios ranging from 4.9 to 6.97, and that supplementation with 800 IU/day during the cold season resulted in fewer episodes of respiratory symptoms and quicker recovery from ARTI [1]. Similarly, a cross-sectional study involving children aged 1 to 18 years demonstrated that those receiving higher weekly Vit. D supplementation (>800 IU) or maintaining serum 25-hydroxy Vit. D concentrations over 30 ng/mL experienced significantly lower infection rates, with the protective effect being most pronounced in children under six years old [3]. Additional evidence reinforces these results, showing that low vitamin D levels independently contribute to treatment failure and prolonged recovery in cases of severe lower RIs, underscoring the nutrient's potential role in improving clinical outcomes [4]. A 2025 randomized trial in Denmark reinforced these benefits, showing that winter Vit. D supplementation (20 µg/day) lessened ARTI-related sick days by 17% and febrile episodes by 43% compared to placebo [5]. Additionally, a meta-analysis of 11 trials confirmed Vit. D supplementation significantly decreases RIs risk (OR: 0.64; 95% CI: 0.49–0.84), particularly with daily dosing regimens [6]. Despite these promising observations, the literature also reflects some inconsistency, with several trials failing to show a noteworthy drop in the incidence or severity of RIs following Vit. D supplementation, likely due to variations in study populations, dosing regimens, baseline Vit. D status, and definitions of deficiency [1]. Nevertheless, there is growing consensus that Vit. D's anti-inflammatory (AI) properties—like reducing levels of pro-inflammatory cytokines (PICs) like IL-6 and C-reactive protein—may contribute to improved recovery and lessened complications in Paediatric ARTI [2]. Given the high ubiquity of Vit. D insufficiency and deficiency in many Paediatric populations, understanding the relationship across Vit. D status, ARTI severity, inflammatory markers, and recovery time is of considerable clinical and public health importance. This study aims to clarify these associations in children aged 1–13 years, providing evidence that may inform future nutritional interventions and therapeutic strategies for managing Paediatric RIs.

METHODOLOGY

Study Design and Setting

Over a span of 12 months, this cross-sectional observational study was carried out in a tertiary-level Paediatric hospital. The study aimed to investigate the link across Vit. D status and both the severity and recovery outcomes in children diagnosed with acute respiratory tract infections (ARTI). Approval for the study was granted by the institutional review board, and informed consent was gotten from the parents or even legal guardians of all participants.

Study Population and Sample Size

141 children, aged 1 - 13 years, presenting with symptoms of ARTI were enrolled. Participants were classified into three clinical categories based on WHO guidelines: No Pneumonia (n=47), Pneumonia (n=47), and Severe Pneumonia (n=47). This stratified sampling ensured equal representation across disease severity groups to facilitate comparative analysis.

Inclusion and Exclusion Criteria

Children were incorporated if they had a clinical diagnosis of ARTI, confirmed by physical examination and, where necessary, radiological evidence. Exclusion criteria included known immunodeficiency, chronic respiratory conditions (like asthma, cystic fibrosis), recent Vit. D supplementation within the last three months (for analysis of baseline Vit. D effect), or comorbid conditions like congenital heart disease or renal impairment.

Data Collection

Demographic and socioeconomic data—age, sex, and household income—were collected through structured caregiver interviews and patient records. Clinical data included ARTI classification, duration of illness, and recovery time, defined as the number of days from diagnosis to resolution of symptoms without medication.

Vit. D Assessment

Serum 25-hydroxyvitamin D [25(OH)D] levels were gauged upon admission utilising a standardized enzyme-linked immunosorbent assay (ELISA). Participants were categorized as Vit. D sufficient (≥ 30 ng/mL), insufficient (20–29 ng/mL), or deficient (< 20 ng/mL), according to Endocrine Society guidelines. Vit. D supplementation status was recorded for each child, with dosage and duration verified through prescription records and caregiver report.

Inflammatory Marker Analysis

Levels of IL-6 along with IL-8 were gauged via high-sensitivity ELISA kits. Blood samples were collected within 24 hours of admission and processed according to manufacturer protocols. These biomarkers were chosen due to their established role in respiratory inflammation and Vit. D-related immune modulation.

Outcome Measures

The primary outcome was ARTI severity in relation to Vit. D status. Secondary outcomes included recovery time and inflammatory marker levels across Vit. D and supplementation categories. Recovery was quantified in days and defined as the point at which the child was

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

symptom-free and clinically stable without ongoing treatment.

Statistical Analysis

Descriptive statistics were utilised to summarize demographic along with clinical characteristics. Chi-square tests evaluated associations between categorical variables, including Vit. D status and ARTI severity. Independent t-tests compared inflammatory marker lvs and recovery duration between supplemented and non-supplemented groups. Pearson's correlation coefficients assessed the link across serum Vit. D lvs and inflammatory markers (IL-6 and IL-8). Effect sizes were configured utilising Cohen's d. A p-value of <0.05 was considered statistically noteworthy. All statistical analyses were done via SPSS Version 25.0 (IBM Corp.).

Bias

"Potential sources of bias included recall bias in supplementation reporting and hospital-based recruitment which may not represent the general population. To minimise bias, supplementation history was verified from prescriptions and standardized assays were used for biochemical measurements."

Study size

"A sample size of 141 was selected based on feasibility during the study period; however, retrospective power analysis indicated that this sample provided >80% power to detect significant differences in recovery duration between supplemented and non-supplemented groups (effect size >0.8, $\alpha=0.05$)."

2.10 Missing data:

"No missing data were recorded for the primary outcomes. Incomplete entries for secondary variables were excluded listwise."

RESULTS

Demographic and Baseline Characteristics

This work enrolled 141 children aged 1–13 years, with balanced representation across three acute respiratory tract infection (ARTI) severity groups: No Pneumonia (n=47), Pneumonia (n=47), and Severe Pneumonia (n=47). Age distribution was broad, with the highest representation at 4 years (13.5%), followed by 6 years (10.6%), and ages 3, 5, and 10 years (each 8.5%). The cohort exhibited nearly equal sex distribution (52.5% female, 47.5% male), minimizing potential sex-based confounding. Socioeconomically, 46.1% of participants were from middle-income backgrounds, 39.0% from low-income households, and

only 14.9% from high-income families, highlighting the predominance of non-affluent backgrounds in the sample.

Vit. D Status and Supplementation

Vit. D insufficiency was prevalent across the cohort, with 63.1% (n=89) classified as insufficient, 16.3% (n=23) deficient, and only 20.6% (n=29) sufficient. Supplementation patterns revealed that 45.4% (n=64) received Vit. D supplementation, while 54.6% (n=77) did not. This distribution enabled robust comparison of outcomes between supplemented and non-supplemented groups, critical for assessing intervention efficacy.

Link across Vit. D Status and ARTI Severity

Chi-square analysis confirmed a statistically noteworthy link across Vit. D status and ARTI severity ($p < 0.05$). Children with insufficient Vit. D lvs bore the greatest burden of severe pneumonia (36%, n=32/89), while deficient children showed lower severe pneumonia rates (17%, n=4/23). In contrast, the sufficient group had fewer severe cases (38%, n=11/29). Notably, the insufficient category demonstrated disproportionate severity compared to deficient children, suggesting that even moderate Vit. D depletion significantly elevates ARTI risk. Cross-tabulation data (Table 1) revealed that Vit. D-sufficient children were more likely to avoid pneumonia (41% no pneumonia) compared to insufficient (30%) and deficient (35%) groups.

Table 1. Vit. D Status and ARTI Severity Distribution.

ARTI_Severity	No Pneumonia	Count	8	2	1	47
		Expected Count	7.7	2.9	9.7	.0
Pneumonia	Count	11	30	6	47	
	Expected Count	7.7	2.9	9.7	.0	
Severe Pneumonia	Count	4	32	1	47	
	Expected Count	7.7	2.9	9.7	.0	
Total		Count	23	89	29	141

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

Expected Count	2.30	8.90	2.90	14.00
----------------	------	------	------	-------

Recovery Days	Yes	7.5	3.10	1.11	.12
---------------	-----	-----	------	------	-----

Vit. D Supplementation, Inflammatory Markers, and Recovery

Vit. D supplementation profoundly lessened inflammatory markers. Supplemented children exhibited significantly lower IL-6 lvs (mean=60.45 pg/ml, SD=3.80) versus non-supplemented (mean=89.56 pg/ml, SD=5.71; $p<.001$, Cohen's $d=4.79$). Similarly, IL-8 lvs were markedly lower in supplemented children (mean=58.61 pg/ml, SD=3.87) compared to non-supplemented (mean=88.43 pg/ml, SD=4.84; $p<.001$, Cohen's $d=4.35$). Pearson correlation analysis confirmed strong negative relationships between Vit. D lvs and both IL-6 ($r=-0.884$, $p<.001$) and IL-8 ($r=-0.780$, $p<.001$), indicating that higher Vit. D concentrations correlate with lessened inflammation.

Recovery Outcomes

Supplemented children recovered dramatically faster (mean=3.11 days, SD=1.12) than non-supplemented peers (mean=12.02 days, SD=1.60; $t(110.3) = 28.35$, $p<.001$). This 8.47-day difference represents a very large effect size (Cohen's $d=1.88$), underscoring supplementation's clinical impact. The recovery advantage persisted across Vit. D status categories: sufficient children recovered in 3.11 days versus 12.02 days for insufficient children.

Table 2. Inflammatory Markers and Recovery by Supplementation Status.

Group Statistics					
	Vit. D supplement	N	Mean	Std. Deviation	Std. Error Mean
IL6_pg ml	No	6	89.56	5.71	.70
	Yes	7	60.45	3.80	.43
IL8_pg ml	No	6	88.43	4.84	.59
	Yes	7	58.61	3.87	.44
	No	6	12.02	1.59	.19



Figure 1. Impact of Vit. D Supplementation on Inflammatory Markers (Interleukin-6, Interleukin-8) and Recovery Time in Paediatric Acute Respiratory Tract Infections.

DISCUSSION

The present study provides robust evidence that Vit. D status is significantly associated with both the severity and recovery outcomes of ARTI in children. The findings are consistent with and extend the current literature, underscoring the multifactorial interplay between micronutrient status, inflammatory response, and social determinants in Paediatric respiratory health. Our results demonstrate that children with insufficient or deficient Vit. D lvs are at a markedly higher risk for developing severe forms of ARTI. The observed pattern—where even moderate insufficiency, not just outright deficiency, is associated with increased disease severity—mirrors the findings of several recent epidemiological and clinical studies [1]. For example, a systematic review published in 2023 found that low Vit. D status in children is linked with a significantly increased risk of RTIs, with odds ratios ranging from 4.90 to 6.97 in different studies. Similarly, a meta-analysis by Larkin and Lassetter (2014) concluded that Vit. D deficiency is associated with both greater risk and severity of acute lower RIs (ALRI), including pneumonia and bronchiolitis, in children below 5 years old [7]. These associations are biologically plausible. Vit. D is known to modulate both innate and adaptive immune responses, enhancing the production of antimicrobial peptides like cathelicidin and defensins, which are crucial for mucosal defense in the respiratory tract [8, 9]. Further, Vit. D deficiency has been linked to an impaired ability to mount an effective immune response to respiratory pathogens, increasing susceptibility to infections and complications [10]. A central finding of this study is the strong negative correlation between serum Vit. D lvs and inflammatory markers (IL-6 and IL-8), as well as the noteworthy reduction in these markers and faster recovery among children who received Vit. D supplementation. This is in line with a 2024 study that found Vit. D deficiency in

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

childhood is associated with increased levels of circulating inflammatory markers, and that supplementation may be beneficial in reducing systemic inflammation [11]. The effect of Vit. D is well-documented; it downregulates PICs like IL-6 and IL-8, which are implicated in the pathogenesis and severity of ARTI. Recent interventional trials have shown that Vit. D supplementation can drop the duration and severity of RIs in children, particularly in those with baseline deficiency. For instance, one randomized controlled trial found that children receiving 800 IU/day of Vit. D for three months during the cold season was associated with fewer respiratory symptom episodes and faster recovery from ARTIs (RR = 0.55). Another study demonstrated that Vit. D supplementation significantly lessened the threat of persistent hypoxemia and treatment failure in children hospitalized with pneumonia [1, 7]. However, it is important to note that the evidence for Vit. D supplementation in preventing the incidence of ARTI is mixed. While some studies report noteworthy reductions in infection rates, others find no difference, possibly due to variations in study protocols, dosing regimens, and baseline Vit. D status. A 2025 meta-analysis of 61,589 participants found no statistically noteworthy reduction in overall acute RIs risk (OR 0.94, 95% CI: 0.88–1.00), though subgroup analyses suggested benefits in deficient populations [12]. The consensus emerging from recent systematic reviews is that the greatest benefit of supplementation is observed in children with the lowest baseline 25(OH)D levels and that daily or weekly dosing (rather than large bolus doses) is most effective [13]. The observed heterogeneity in Vit. D's efficacy across studies may be partly explained by population-specific factors and dosing protocols. While our data demonstrate noteworthy benefits of supplementation in reducing ARTI severity and accelerating recovery particularly among deficient children broader meta-analyses reveal critical nuances. A 2023 meta-analysis of eight RCTs found no overall reduction in ARTI incidence with supplementation in healthy children (OR=0.98, 95% CI:0.90–1.08) [14], suggesting limited preventive efficacy in Vit. D-replete populations. Conversely, a 2024 cross-sectional study highlighted that targeted supplementation (>600 IU/week) in deficient preschool children lessened RIs risk by nearly 50% (OR=0.523, p<0.001) [15]. This aligns with evidence that high-dose regimens (>1000 IU/day) specifically lower Influenza A incidence (OR=0.39, 95% CI:0.26–0.59), underscoring the importance of personalized dosing based on baseline status and pathogen profiles. Thus, future interventions should prioritize risk stratification targeting deficient populations and using pathogen-adjusted dosing to optimize therapeutic outcomes. The findings may be most applicable to children attending tertiary hospitals in similar socioeconomic

settings and may not be directly generalisable to rural or community-based populations.

Limitations

This study has several limitations. First, its cross-sectional design precludes inference of causality. Second, unmeasured confounders such as dietary patterns and sunlight exposure may have influenced Vit. D levels. Third, the study was conducted in a single tertiary hospital, which may limit external validity. Finally, supplementation history was partly reliant on caregiver recall, introducing the possibility of recall bias.”

CONCLUSION

This study provides compelling evidence that Vit. D status plays a critical role in determining both the severity and recovery outcomes of ARTI in Paediatric patients. A high ubiquity of Vit. D insufficiency along with deficiency was observed among children with ARTI, with insufficient levels notably associated with a greater burden of severe pneumonia. Importantly, Vit. D supplementation was linked to significantly lower levels of PICs (IL-6 and IL-8) and substantially faster recovery times, highlighting its prospective as a supportive therapeutic strategy. These findings reinforce the immunomodulatory and AI functions of Vit. D in the context of Paediatric respiratory health. While causality cannot be definitively established due to the cross-sectional nature of the study, the strong associations observed underscore the importance of monitoring and optimizing Vit. D levels in children, particularly those at higher risk for RIs. Further longitudinal along with interventional studies are warranted to validate these conclusions and to institute clear guidelines on Vit. D supplementation as part of standard care in managing Paediatric ARTI.

Funding: This research received no external funding.

REFERENCES

1. Marusca LM, Reddy G, Blaj M, Prathipati R, Rosca O, Bratosin F, Bogdan I, Horhat RM, Tapos GF, Marti DT, Susan M, Pingilati RA, Horhat FG, Adelina M. The Effects of Vit. D Supplementation on RIs in Children under 6 Years Old: A Systematic Review. *Diseases*. 2023 Aug 8;11(3):104. doi: 10.3390/diseases11030104. PMID: 37606475; PMCID: PMC10443358.
2. Krajewska M, Witkowska-Sędek E, Rumińska M, Stelmaszczyk-Emmel A, Sobol M, Majcher A and Pyrzak B (2022) Vit. D Effects on Selected Anti-Inflammatory and Pro-Inflammatory Markers of Obesity-Related Chronic Inflammation. *Front.*

Association of Vitamin D Status with Severity and Recovery in Paediatric Acute Respiratory Tract Infections: A Cross-Sectional Study

- Endocrinol. 13:920340. doi: 10.3389/fendo.2022.920340
- Tanase E, Marusca LM, Horhat FG, Susan M, Susan R, Horhat R, Dinu S, Dragomir TL, Tanasescu S. Assessing the Impact of Vit. D Supplementation on RIss in Children and Adolescents: A Cross-Sectional Study. *Nutrients*. 2024 Nov 19;16(22):3953. doi: 10.3390/nu16223953. PMID: 39599738; PMCID: PMC11597694.
 - Haugen, J., Basnet, S., Hardang, I. et al. Vit. D status is associated with treatment failure and duration of illness in Nepalese children with severe pneumonia. *Pediatr Res* 82, 986–993 (2017). <https://doi.org/10.1038/pr.2017.71>
 - Clerico JW, Thams L, Stounbjerg NG, Hauger H, Damsgaard CT, Mølgaard C. Effects of Vit. D supplementation on acute respiratory tract infections in 6-8-year-old children: a randomized clinical trial. *Eur J Nutr*. 2025 May 1;64(4):170. doi: 10.1007/s00394-025-03674-1. PMID: 40310565.
 - Charan J, Goyal JP, Saxena D, Yadav P. Vit. D for prevention of respiratory tract infections: A systematic review and meta-analysis. *J Pharmacol Pharmacother*. 2012 Oct;3(4):300-3. doi: 10.4103/0976-500X.103685. PMID: 23326099; PMCID: PMC3543548.
 - Larkin A, Lassetter J. Vit. D deficiency and acute lower RIss in children younger than 5 years: identification and treatment. *J Pediatr Health Care*. 2014 Nov-Dec;28(6):572-82; quiz 583-4. doi: 10.1016/j.pedhc.2014.08.013. Epub 2014 Oct 18. PMID: 25441970; PMCID: PMC7127565.
 - Walker VP, Modlin RL. The Vit. D connection to Paediatric infections and immune function. *Pediatr Res*. 2009 May;65(5 Pt 2):106R-113R. doi: 10.1203/PDR.0b013e31819dba91. PMID: 19190532; PMCID: PMC2925470.
 - Gunville CF, Mourani PM, Ginde AA. The role of Vit. D in prevention and treatment of infection. *Inflamm Allergy Drug Targets*. 2013 Aug;12(4):239-45. doi: 10.2174/18715281113129990046. PMID: 23782205; PMCID: PMC3756814.
 - Esposito S, Lelii M. Vit. D and respiratory tract infections in childhood. *BMC Infect Dis*. 2015 Oct 28; 15:487. doi: 10.1186/s12879-015-1196-1. PMID: 26521023; PMCID: PMC4628332.
 - Okuyan O, Dumur S, Elgormus N, Uzun H. The Link across Vit. D, Inflammatory Markers, and Insulin Resistance in Children. *Nutrients*. 2024 Sep 5;16(17):3005. doi: 10.3390/nu16173005. PMID: 39275320; PMCID: PMC11396811.
 - Jolliffe DA, Camargo CA Jr, Sluyter JD, Aglipay M, Aloia JF, Bergman P, Bischoff-Ferrari HA, Borzutzky A, Bubes VY, Damsgaard CT, Ducharme FM, Dubnov-Raz G, Esposito S, Ganmaa D, Gilham C, Ginde AA, Golan-Tripto I, Goodall EC, Grant CC, Griffiths CJ, Hibbs AM, Janssens W, Khadilkar AV, Laaksi I, Lee MT, Loeb M, Maguire JL, Majak P, Manaseki-Holland S, Manson JE, Mauger DT, Murdoch DR, Nakashima A, Neale RE, Pham H, Rake C, Rees JR, Rosendahl J, Scragg R, Shah D, Shimizu Y, Simpson-Yap S, Kumar GT, Urashima M, Martineau AR. Vit. D supplementation to prevent acute RIss: systematic review and meta-analysis of stratified aggregate data. *Lancet Diabetes Endocrinol*. 2025 Apr;13(4):307-320. doi: 10.1016/S2213-8587(24)00348-6. Epub 2025 Feb 21. Erratum in: *Lancet Diabetes Endocrinol*. 2025 May 16:S2213-8587(25)00158-5. doi: 10.1016/S2213-8587(25)00158-5. PMID: 39993397; PMCID: PMC12056739.
 - Feketea G, Boesan CI, Stanciu LA, Buzoianu AD, Zdrenghea MT. The Role of Vit. D Deficiency in Children with Recurrent Wheezing-Clinical Significance. *Front Pediatr*. 2020 Jun 30; 8:344. doi: 10.3389/fped.2020.00344. PMID: 32695735; PMCID: PMC7338661.
 - Fang Q, Wu Y, Lu J, Zheng H. A meta-analysis of the link across Vit. D supplementation and the risk of acute respiratory tract infection in the healthy Paediatric group. *Front Nutr*. 2023 Jun 20; 10:1188958. doi: 10.3389/fnut.2023.1188958. PMID: 37408991; PMCID: PMC10318162.
 - Sarau OS, Rachabattuni HC, Gadde ST, Daruvuri SP, Marusca LM, Horhat FG, Fildan AP, Tanase E, Prodan-Barbulescu C, Horhat DI. Exploring the Preventive Potential of Vit. D against RIss in Preschool-Age Children: A Cross-Sectional Study. *Nutrients*. 2024 May 23;16(11):1595. doi: 10.3390/nu16111595. PMID: 38892528; PMCID: PMC11173803.