



## Original Research Article

# Risk factors of Vitamin D deficiency in children among Parents

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**Abstract: Background:** Vitamin D is an essential element in our body.

Its deficiency causes bones to become soft and weak known as rickets in children. We get vitamin D in very small amount from our dietary sources, but it is formed via skin with the help of sunlight, sufficient exposure to sunlight along with the dietary intake are necessary to maintain the normal level. Babies obtained vitamin D from the mother during pregnancy and soon after birth they get it from fortified milk, as they grows, they get from their diets and other vitamin D supplements. **Methods:** An hospital based cross-sectional study was conducted on 67 parents in selected hospital of Dehradun, Uttarakhand. Data were collected using structured questionnaire to assess the risk factors of vitamin D Deficiency. Parents were interviewed on the basis of questionnaire developed. **Results:** Study findings showed that parents do practiced exposure of sun in order to get vitamin D to their children but still inconsistencies found, 71.64 % parents reported their children were not getting Vitamin D supplements, 41.79 percent of children were not given vitamin D-rich foods, 23.43 percent of children were not consumed milk every day.

**Conclusion:** Parents are to readdress the value of consumption of vitamin D rich diet, exposure of sunlight in order to get sufficient amount and could prevent its deficiency.

**Keywords:** Vitamin D deficiency, Risk factors, Knowledge, Practice, Parents, Under-five children

## INTRODUCTION

Vitamin D is an essential element in our body and necessary in the fight against infections in our body. Children need sun exposure regularly as to maintain vitamin D in the blood. There are various food sources of vitamin D but still sunlight in order to maintain the normal value. Vitamin D deficiency can cause rickets,

delayed motor development, muscle weakness, aches and pains, and fractures in children who do not obtain enough vitamin D in their diet as well not exposing sun regularly. Study showed that vitamin D Deficiency is common in children, Seasons like spring and winter are the most important risk factors for vitamin D deficiency.<sup>1</sup> There were 40.24% children were

deficient and 25.44%, insufficient levels of 25(OH)D and also found in relatively in young age (Suresh Kumar et al. 2014)<sup>2</sup>. The prevalence of vitamin D deficiency is more common in females and it was also found that the chances of deficient are three times higher in children with mothers who have already known case of vitamin d deficiency (Nichols EK, 2015)<sup>3</sup>. In urban areas the consumption of dairy is more but when we compare the deficiency in rural and urban area, the deficiency 19% were found in urban areas or 12 % in rural areas. Children are not getting enough vitamin D because of not taking food, which they do not like even though it is highly nutritious or rich vitamin D (Nguyen Bao KL 2018)<sup>3-4</sup>.

As we all know sunlight having a good source of vitamin D, children are not exposed enough to sunlight. Children with vitamin D deficient are also associated with recurrent respiratory problems and wheezing (Prasad S, 2016)<sup>5,6</sup>. Several factors like diet, sun exposure and prolonged breastfeeding without

vitamin d supplements are associated with it. So children are to be routinely checked for their vitamin levels. Providing vitamin D rich diet to their children and consciously exposing them to sun as routine is a big concern nowadays.

#### Material and methods:

We targeted the parents of under-five children admitted for any kind of condition in the Pediatric ward of selected Hospital Dehradun, Uttarakhand. A descriptive design was used to find the risk factors of vitamin D deficiency in children. Sixty-seven parents were included in the study. Parents of children who were very sick and not stable at time of data collection was excluded from the study. Parent who fulfilled inclusion criteria were enrolled purposively and interviewed for the risk factors. Various items on sun exposure, dietary and other factors are included in the developed tools. The data were collected and analyzed based on the objectives of the study using descriptive statistic.

## RESULTS

A total of 67 participants characteristics are presented in the Table 1. Most of parents were female 67.1% 22 with the age group of 22-33 years. Majority of the families 62% has income of less than 20,000 Rs per month. Most of them belongs to a joint family. Table no.2 depicts that 65.67 percent of the children were boys. Near half of children were infants and 37.31 % are toddler and 32.83 are preschool. 2.98 percent of children have a history of vitamin D insufficiency, majority of children growth and development attained normal with moderate physical activity.

**Table 1: Characteristics of study participants**

|       |                              | N=67          |                |
|-------|------------------------------|---------------|----------------|
| S. N. | Sample Characteristics       | Frequency (f) | Percentage (%) |
| 1.    | <b>Informant</b>             |               |                |
|       | A. Mother                    | 45            | 67.2           |
|       | B. Father                    | 22            | 32.8           |
| 2.    | <b>Age of Informant</b>      |               |                |
|       | A. 22-33 Years               | 51            | 76.1           |
|       | B. 34-45 Years               | 16            | 23.9           |
| 3.    | <b>Mother Age (n=45)</b>     |               |                |
|       | C. 22-33 Years               | 35            | 77.8           |
|       | D. 34-45 Years               | 10            | 22.2           |
| 4.    | <b>Monthly Salary in Rs.</b> |               |                |
|       | A. 5,000-20,000              | 42            | 62.69          |
|       | B. 20,001-35,000             | 11            | 16.42          |
|       | C. 35,001-50,000             | 12            | 17.91          |
|       | D. 50,001-70,000             | 02            | 2.98           |
| 5.    | <b>Residence</b>             |               |                |
|       | A. Rural                     | 21            | 31.34          |
|       | B. Urban                     | 21            | 31.34          |
|       | C. Semi –urban               | 25            | 37.32          |

|    |                        |    |       |
|----|------------------------|----|-------|
| 6. | <b>Types of family</b> |    |       |
|    | A. Nuclear             | 20 | 29.86 |
|    | B. Joint               | 47 | 70.14 |

| Table 2: Characteristics of children |                                        |               | N=67           |
|--------------------------------------|----------------------------------------|---------------|----------------|
| S.No.                                | Characteristics                        | Frequency (f) | Percentage (%) |
| 1.                                   | <b>Gender</b>                          |               |                |
|                                      | A. Boy                                 | 44            | 65.67          |
|                                      | B. Girl                                | 23            | 34.32          |
| 2.                                   | <b>Age group</b>                       |               |                |
|                                      | A. Infancy                             | 30            | 44.77          |
|                                      | B. Toddler                             | 27            | 40.29          |
|                                      | C. Pre-Schooler                        | 10            | 14.92          |
| 3.                                   | <b>History of Vitamin D Deficiency</b> |               |                |
|                                      | A. Yes                                 | 02            | 2.99           |
|                                      | B. No                                  | 65            | 97.01          |
| 4.                                   | <b>Breast Feeding</b>                  |               |                |
|                                      | A. Yes                                 | 42            | 62.69          |
|                                      | B. No                                  | 25            | 37.31          |
| 5.                                   | <b>Growth and Development Pattern</b>  |               |                |
|                                      | A. Normal                              | 58            | 86.56          |
|                                      | B. Delayed                             | 09            | 13.44          |

**Table No.3: Table No: 3 Frequency Percentage distribution of risks factors of vitamin D deficiencies among children**

| N=67 |                                                                                           |               |                |
|------|-------------------------------------------------------------------------------------------|---------------|----------------|
| S.No | Items related to Risk factor of vitamin D deficiency                                      | Frequency (f) | Percentage (%) |
| 1    | <b>How often do you expose your child in the sunlight per week?</b>                       |               |                |
|      | A. Daily                                                                                  | 47            | 70.14          |
|      | B. Not at all                                                                             | 20            | 29.85          |
| 2    | <b>How many hours does your child play outdoor games/ activities?</b>                     |               |                |
|      | A. Nil                                                                                    | 21            | 31.34          |
|      | B. 1-2 hours                                                                              | 25            | 37.31          |
|      | C. 3-4 hours                                                                              | 14            | 20.89          |
|      | D. 5-6 hours                                                                              | 07            | 10.44          |
| 3    | <b>Do you strictly follow every day routine for your child to expose in the sunlight?</b> |               |                |
|      | A. Yes                                                                                    | 46            | 68.65          |
|      | B. No                                                                                     | 21            | 31.34          |
| 4    | <b>Does the sunlight enter your house or rooms?</b>                                       |               |                |
|      | A. Yes                                                                                    | 66            | 98.50          |
|      | B. No                                                                                     | 01            | 1.49           |
| 5    | <b>Which milk does your child drink?</b>                                                  |               |                |
|      | A. Breastfeed                                                                             | 37            | 55.22          |
|      | B. Cow                                                                                    | 25            | 37.31          |

|     |                                                                                  |    |       |
|-----|----------------------------------------------------------------------------------|----|-------|
|     | C. Buffalo                                                                       | 04 | 5.97  |
|     | D. Any others                                                                    | 01 | 1.49  |
| 6   | <b>How many glasses of milk per day do you give to your child?</b>               |    |       |
|     | A. Not at all                                                                    | 09 | 13.43 |
|     | B. 1-2 glass                                                                     | 18 | 26.87 |
|     | C. More than 2 glass                                                             | 21 | 31.34 |
|     | D. Not applicable                                                                | 19 | 28.36 |
| 7   | <b>Do you give multi-vitamin to your child as recommended by doctor?</b>         |    |       |
|     | A. Yes                                                                           | 56 | 83.59 |
|     | B. No                                                                            | 11 | 16.41 |
| 8   | <b>Do you give vitamin D supplement to your child daily?</b>                     |    |       |
|     | A. Yes                                                                           | 19 | 28.36 |
|     | B. No                                                                            | 48 | 71.64 |
| 9   | <b>Is your child exclusively breastfed?</b>                                      |    |       |
|     | A. Yes                                                                           | 20 | 29.85 |
|     | B. No                                                                            | 47 | 70.14 |
| 10  | <b>Which of the following vitamin D-rich foods you give to your child daily?</b> |    |       |
|     | A. Cereal food                                                                   | 06 | 8.95  |
|     | B. Cheese                                                                        | 11 | 16.42 |
|     | C. Mushroom                                                                      | 03 | 4.47  |
|     | D. Egg/ Fish                                                                     | 22 | 32.83 |
|     | E. Not applicable                                                                | 25 | 37.32 |
| 11. | <b>Do you ever have Vitamin D Deficiency?</b>                                    |    |       |
|     | A. Yes                                                                           | 01 | 1.49  |
|     | B. No                                                                            | 66 | 98.50 |
| 12. | <b>Have you ever experienced fracture/ bendable bone in your child?</b>          |    |       |
|     | A. Yes                                                                           | 01 | 1.49  |
|     | B. No                                                                            | 66 | 98.50 |
| 13. | <b>Does your child have Vitamin D Deficiency?</b>                                |    |       |
|     | A. Yes (Currently received treatment)                                            | 05 | 7.46  |
|     | B. No                                                                            | 62 | 92.53 |
| 14. | <b>Does your child have frequent respiratory infection?</b>                      |    |       |
|     | A. Yes (Not hospitalized)                                                        | 05 | 7.46  |
|     | B. No                                                                            | 62 | 92.53 |

**Table No 3** shows that majority were practicing their children to expose to sunlight on a daily basis but 29.85 children were not at all getting daily exposure of sunlight. 37.31 children were not playing outdoor games even. 31.34 parents reported that they are not following strict daily routine to expose their children to sunlight, (98.50 percent) of families enters sunlight to their house or rooms. Half of the participants reported that they give breastmilk to children, more than one third of participants reported they do give cow's milk to their children. They have given multivitamin (83.58 percent) to their children but majority of them not given vitamin D supplement. 29.85 percent of underfive are exclusively breastfed, and 7.46 percent of children has vitamin D deficiency.

**Table no.4 Rank wise distribution of risk factors of vitamin D deficiencies in children**  
N=67

| Rank | Items related to Risk factor of vitamin D deficiency                              | Frequency (f) | Percentage (%) |
|------|-----------------------------------------------------------------------------------|---------------|----------------|
| 1    | Vitamin D supplement not given to child                                           | 48            | 71.64          |
| 2    | Infant and Toddler on Breast milk                                                 | 37            | 55.22          |
| 3    | Children did not play outdoor games/ activities                                   | 21            | 31.34          |
| 4    | Parents did not follow their child to expose in the sunlight in every day routine | 21            | 31.34          |
| 5    | Exclusively breastfed                                                             | 20            | 29.85          |
| 6    | Children were not exposed to sunlight per week                                    | 20            | 29.85          |
| 7    | Not taking milk daily                                                             | 09            | 23.43          |
| 8    | Children have frequent respiratory infection                                      | 05            | 7.46           |
| 9    | Sunlight does not enter their house or rooms                                      | 01            | 1.49           |

**Table No.4** indicates that 71.64 percent of parents said they were not provided vitamin D supplements to their children, more than of the participants reported their children are on breastmilk, children are not playing outdoor games or activities and their parents are not following strict schedule in order to get exposure of sunlight. 31.34 % of children were not exposed to sun as part of their daily routine or 29.85 even week. 23.43 percent of children were not consumed milk every day. 7.46% of children experience respiratory infections frequently, and 1.49 percent of children do not have access to sunshine because it does not reach their house or rooms.

## DISCUSSION

The present study assessed risk factors of vitamin D deficiency in children. The data were taken from the parents of under-five children. Most of them are mothers with the age group range of 22-33 years. They were almost young. Studies reported that chances of vit. D deficiency in infants were linked with the younger age of mother and who has higher number of pregnancies (Ian Marshal, 2016)<sup>7</sup>. 71.64 percent of children were not getting vitamin D supplements or calcium on a daily, 29.85 percent of children found exclusively breastfed. Studied found that there is an association with vitamin D deficiency in children with relatively exclusive breastfeeding, inadequate sun exposure, and no vitamin D supplements (Angurana SK etal 2014)<sup>8</sup>. Children (31.34) were not playing outdoor games so the chances of getting deficient is also high even 29.8 children were not a tall exposing sunlight. As we all know sunlight is the best sources of it and very small amount from our dietary sources but it is formed via skin with the help of sunlight. Sufficient exposure to sunlight along with the dietary intake is necessary to maintain the normal level. Babies obtained from mother during pregnancy and

soon after birth they get it from fortified milk, as they grow they get from their diets and other vitamin D supplements. The most widely accepted approach to building healthy vitamin D stores in infants is through vitamin D supplementation<sup>9</sup>. Only 48.7% of mothers given vitamin D supplements to their children. 23.43 percent of children were not given milk every day, 1.49 percent of children do not have access to sunshine because it does not reach their home or rooms. It is reported that vitamin D deficiency in infants could be prevented if the mother is taking vitamin D supplementation (Khalil Salameh)<sup>10</sup>. Another study of Alaa Sabah Hussein reported majority of respondents were aware of vitamin D and knew that sun exposure is the best source, however there were some discrepancies. Similar findings from Safa'a Al-Qudah, Leyla Abuhussein, Samar Al Sbaihion mothers' knowledge and practices about vitamin D deficiency in infants and children. Findings revealed that most of participants reported that lack of sun exposure and decreased vitamin D rich foods as risk factors and rickets as complication of vitamin D deficiency.

## Conclusion

The research study concluded that even though parents know the value of sun exposure but could not able to achieved, as they are not practicing regularly. Based on the likes and dislikes of the children parents are not consciously giving vitamin D rich food to their children. So vitamin D Deficiency in children is of concern now and need a focus area.

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## 8. Conflicts of interest

No conflicts of interest

9. Ethical Approval: Ethical approval was obtained from Ethics Committee of SRHU.

## 10. Informed Consent

Informed consent was obtained from all the participants.

## References:

1. Roh YE, Kim BR, Choi WB, Kim YM, Cho MJ, Kim HY, Park KH, Kim KH, Chun P, Kim SY, Kwak MJ. Vitamin D deficiency in children aged 6 to 12 years: single center's experience in Busan. *Ann Pediatr Endocrinol Metab*. 2016 Sep;21(3):149-154. doi: 10.6065/apem.2016.21.3.149. Epub 2016 Sep 30. PMID: 27777907; PMCID: PMC5073161.
2. Angurana SK, Angurana RS, Mahajan G, Kumar N, Mahajan V. Prevalence of vitamin D deficiency in apparently healthy children in north India. *J Pediatr Endocrinol Metab*. 2014 Nov;27(11-12):1151-6. doi: 10.1515/jpem-2013-0387. PMID: 25006749.
3. Nichols EK, Khatib IM, Aburto NJ, Serdula MK, Scanlon KS, Wirth JP, Sullivan KM. Vitamin D status and associated factors of deficiency among Jordanian children of preschool age. *Eur J Clin Nutr*. 2015 Jan;69(1):90-5. doi: 10.1038/ejcn.2014.142. Epub 2014 Aug 13. PMID: 25117992; PMCID: PMC7607367.
4. Nguyen Bao KL, Sandjaja S, Poh BK, Rojroongwasinkul N, Huu CN, Sumedi E, Aini JN, Senaprom S, Deurenberg P, Bragt M, Khouw I; SEANUTS Study Group. The Consumption of Dairy and Its Association with Nutritional Status in the South East Asian Nutrition Surveys (SEANUTS). *Nutrients*. 2018 Jun 13;10(6):759. doi: 10.3390/nu10060759. PMID: 29899251; PMCID: PMC6024724.
5. Prasad S, Rana RK, Sheth R, Mauskar AV. A Hospital Based Study to Establish the Correlation between Recurrent Wheeze and Vitamin D Deficiency Among Children of Age Group Less than 3 Years in Indian Scenario. *J Clin Diagn Res*. 2016 Feb;10(2):SC18-21. doi: 10.7860/JCDR/2016/17318.7287. Epub 2016 Feb 1. PMID: 27042548; PMCID: PMC4800614.
6. Bener A, Ehlayel MS, Bener HZ, Hamid Q. The impact of Vitamin D deficiency on asthma, allergic rhinitis and wheezing in children: An emerging public health problem. *J Family Community Med*. 2014 Sep;21(3):154-61. doi: 10.4103/2230-8229.142967. PMID: 25374465; PMCID: PMC4214003.
7. Marshall I, Mehta R, Ayers C, Dhumal S, Petrova A. Prevalence and risk factors for vitamin D insufficiency and deficiency at birth and associated outcome. *BMC Pediatr*. 2016 Dec 8;16(1):208. doi: 10.1186/s12887-016-0741-4. PMID: 27931209; PMCID: PMC5146866
8. Al-Qahtani SM, Shati AA, Alqahtani YA, Dawood SA, Siddiqui AF, Zaki MSA, et al. Prevalence and Correlates of Vitamin D Deficiency in Children Aged Less than Two Years: A Cross-Sectional Study from Aseer Region, Southwestern Saudi Arabia. *Healthcare* 2022;10:1064. <https://doi.org/10.3390/healthcare10061064>.
9. Sheehy T, Sharma S. The nutrition transition in the Republic of Ireland: trends in energy and nutrient supply from 1961 to 2007 using Food and Agriculture Organization food balance sheets. *British journal of nutrition*. 2011 Oct;106(7):1078-89.
10. Salameh K, Al-Janahi NS, Reedy AM, Dawodu A. Prevalence and risk factors for low vitamin D status among breastfeeding mother-infant dyads in an environment with abundant sunshine. *Int J Womens Health*. 2016 Sep 23;8:529-535. doi: 10.2147/IJWH.S107707. PMID: 27729814; PMCID: PMC5042197.
11. S H Alaa etal. Parental Awareness and Knowledge of Vitamin D and Its Health Benefits for Children *Journal of International Dental and Medical Research* ISSN 1309-100X Vitamin D and Its Health Benefits for Children <http://www.jidmr.com>
12. Safa'a Al-Qudah , Leyla Abuhussein , and Samar Al Sbahi. Maternal Awareness of Vitamin D Deficiency in Infants. [https://d197for5662m48.cloudfront.net/documents/publicationstatus/62789/preprint\\_pdf/3cao e849d5bedcda2e5077eb42235822.pdf](https://d197for5662m48.cloudfront.net/documents/publicationstatus/62789/preprint_pdf/3cao e849d5bedcda2e5077eb42235822.pdf)
13. Balasubramanian S. Vitamin D deficiency in breastfed infants & the need for routine vitamin D supplementation. *Indian J Med Res*. 2011 Mar;133(3):250-2. PMID: 21441676; PMCID: PMC3103147.
14. Khadilkar, A., Kajale, N., Oza, C. et al. Vitamin D status and determinants in Indian children and adolescents: a multicentre study. *Sci Rep* 12, 16790 (2022). <https://doi.org/10.1038/s41598-022-21279-0>
15. Aparna P, Muthathal S, Nongkynrih B, Gupta SK. Vitamin D deficiency in India. *J Family Med Prim Care*. 2018 Mar-Apr;7(2):324-330. doi: 10.4103/jfmpe.jfmpe\_78\_18. PMID: 30090772; PMCID: PMC6060930.

16. Pettifor JM, Thandrayen K, Thacher TD. Vitamin D deficiency and nutritional rickets in children. In: *Vitamin D* 2018 Jan 1 (pp. 179-201). Academic Press.