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A RETROSPECTIVE STUDY ON IMPACT OF COVID PANDEMIC ON VITAMIN D LEVELS IN CHILDREN AGED 6 MONTHS TO 12 YEARS IN POST COVID ERA

Running title: A retrospective study on impact of covid pandemic on vitamin D levels in children aged 6 months to 12 years in post covid era

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Abstract:

Study title: A retrospective study on impact of covid pandemic on vitamin D levels in children aged 6 months to 12 years in post covid era

Aims: To determine the severity of deficiency and the presenting features

Introduction: Vitamin D insufficiency affects almost 50% of the population worldwide. An estimated 1 billion people worldwide, across all ethnicities and age groups, have a vitamin D deficiency (VDD). This pandemic of hypovitaminosis D can mainly be attributed to lifestyle and environmental factors that reduce exposure to sunlight, which is required for ultraviolet-B (UVB)-induced vitamin D production in the skin. The high prevalence of vitamin D

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insufficiency is a particularly important public health issue because hypovitaminosis D is an independent risk factor for total mortality in the general population. Many health care providers have increased their recommendations for vitamin D supplementation to at least 1000 IU.

Methodology: this study was done over a span of 10 months from September 2021 to July 2022
This was a retrospective descriptive study in which data were recorded for all patients aged from 6 months to 12 years of age with features suggestive of vitamin D deficiency seen in Dr DY Patil Medical College and Hospital, Pune for a period of 10 months
The Health Research and ethics committee of Dr DY Patil Medical College and Hospital, Pune approved the study and waived the requirement for the informed consent. A total of 69 patients were included in this study.
Results: 69 patients were included in the study out of which 39 were males { 56.52%} and 30 were females { 43.48%} . the main presenting feature was bowing of legs { 31.9%} followed by difficulty in walking in 15.9%
Out of 69 children 53 had severe deficiency, 13 had mild to moderate deficiency and 3 had optimum levels of vitamin D.

28 children belonged to the age group of 1-5 years followed by 18 children in age group of 5-10 years and 11 children in age group less than 1 year and 10-15 years
Out of the entire study group 56 children had bony deformities and 13 had neurodevelopmental presentation
Conclusion: the above results emphasise the fact that due to covid most of the children were restricted to stay indoors for several months leading to vitamin D deficiency in them. it also emphasis the fact that regular screening of children should be done with respect to vitamin D levels and also other micronutrients and children should be encouraged to have some amount of sun exposure to get natural supplementation of vitamin D and also be supplemented at desired intervals so that they adequate amount of vitamin D levels.
Keywords : frontal bossing, hypovitaminosis, rickets, vitamin D deficiency
Study title : A retrospective study on impact of covid pandemic on vitamin D levels in children aged 6 months to 12 years in post covid era

Aims: To determine the severity of deficiency and the presenting features
Inclusion criteria : 1) all children aged 6m to 12 years
2) all children showing in opd in that age group
3) all children having features suggestive of vitamin D deficiency
Exclusion criteria : 1) all children not consenting to the test
2) all children not belonging to the age group of 6m to 12 years
3)all children having chronic kidney disease and skin infections such as ichthiosis

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Introduction : Insufficient vitamin D levels are a problem for about 50% of people globally. [1] It is believed that 1 billion individuals globally, of all ages and ethnicities, are vitamin D deficient (VDD). [1-3] The main causes of this hypovitaminosis D pandemic are environmental and lifestyle choices that limit exposure to sunshine, which is necessary for ultraviolet-B (UVB)-induced vitamin D synthesis in the skin. The melanin in the skin of black individuals absorbs more UVB than that of white people, therefore they need more sun exposure to create the same quantity of vitamin D. Because hypovitaminosis D is an independent risk factor for total mortality in the general population, the high incidence of vitamin D insufficiency is a significant public health concern. Numerous medical professionals now advise taking supplements of at least 1000 IU of vitamin D. [6] A 2007 meta-analysis found a strong correlation between vitamin D intake and significantly lower mortality.

Because it can be produced in the skin by exposure to sunshine, vitamin D is special. There are two types of vitamin D. Mushrooms that have been exposed to the sun naturally contain vitamin D2, which is produced by UV irradiating the yeast sterol ergosterol. It is the most "natural" type because people manufacture vitamin D3 when UVB rays from the sun strikes the skin. The majority of oil-rich fish, including salmon, mackerel, and herring, contain vitamin D3 and human beings cannot produce vitamin D2.

Metabolism of vitamin D : UV radiation causes 7 dehydrocholesterol to be converted in the skin to Vitamin D3, which is then delivered into the bloodstream in bound form (along with Vitamin D binding protein). It travels from the circulation to the liver where it is converted to 25(OH)D vitamin D. Following this, the kidney and some other organs undergo hydroxylation to produce 1, 25 dihydroxyvitamin D, the most active form of vitamin D, for which the exact mechanism is unknown.

The main process controlling the production of 1, 25 dihydroxyvitamin D is regulated by para thyroid hormone and is accelerated by low serum calcium and phosphate levels. Intestine, bo ne, and numerous other tissues all include cellular receptors for the active form of vitamin D.

Rickets only shows up clinically when there is a substantial Vitamin D deficit. The primary determinant of 25(OH)D concentrations may be sun exposure.

Only 10-15% of dietary calcium and roughly 60% of phosphorus are absorbed without vitamin D. A sufficient vitamin D level increases the absorption of calcium and phosphorus by 30–40% and 80%, respectively. VDD causes problems in the metabolism of calcium, phosphorus, and bone. PTH levels rise as a result of VDD's reduced ability to absorb dietary calcium and phosphorus.

Osteopenia and osteoporosis are brought on by the general decrease in bone mineral density (BMD) and the localised foci of bone weakening brought on by the PTH-mediated increase in osteoclastic activity. A mineralization flaw in the skeleton results from an insufficient calcium-phosphorus product. [1] This deficiency causes a number of skeletal abnormalities, including rickets, in young children whose skeletons contain little mineral. Additionally, VDD results in muscle weakness, which makes it difficult for affected children to stand and walk.

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Methodology : this study was done over a span of 10 months from September 2021 to July 2022

All patients coming to the opd as well the ipd patients having features of vitamin D deficiency were considered to be a part of the study and were screened for it. Relavent information such as age, duration of symptoms before presenting, presenting symptoms, investigation examination findings were recorded . the data was recorded on Microsoft 2010 excel sheet and analysed with SSPS software version 20

This was a descriptive study in which data were recorded for all patients aged from 6 months to 12 years of age with features suggestive of vitamin D deficiency seen in Dr DY Patil Medical College and Hospital, pune for a period of 10 months

The Health Research and ethics committee of Dr DY Patil Medical College and Hospital , pune approved the study and waived the requirement for the informed consent. A total of 69 patients were included in this study .

Results : 69 patients were included in the study out of which 39 were males { 56.52%} and 30 were females { 43.48%} . the main presenting feature was bowing of legs { 31.9%} followed by difficulty in walking in 15.9%

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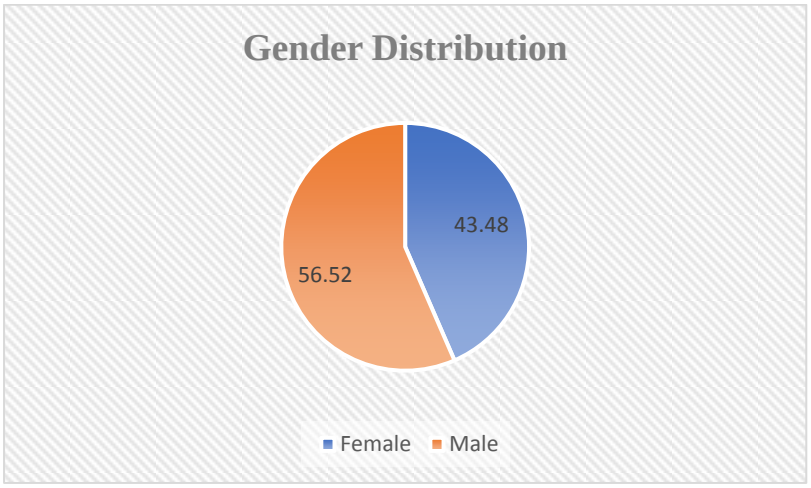

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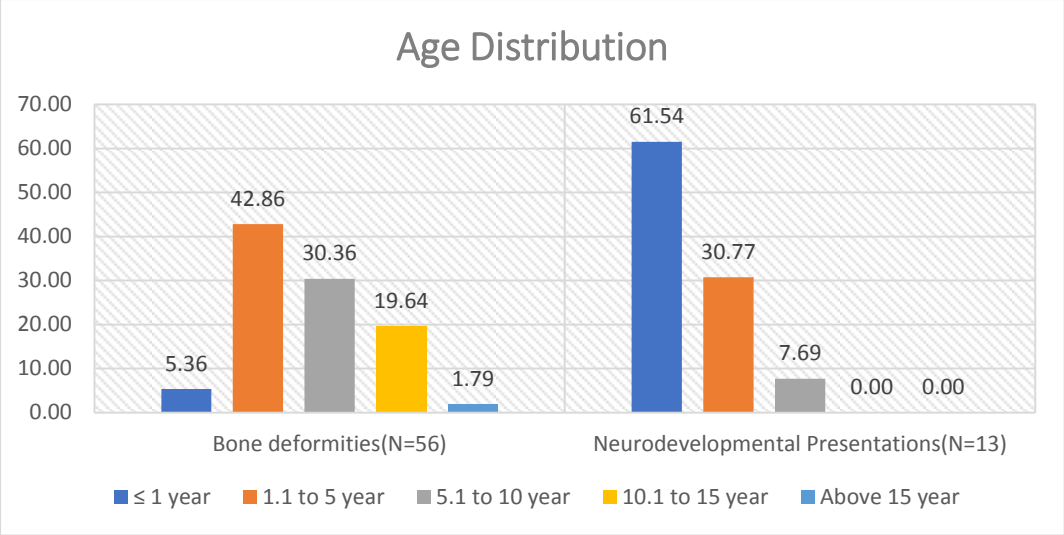
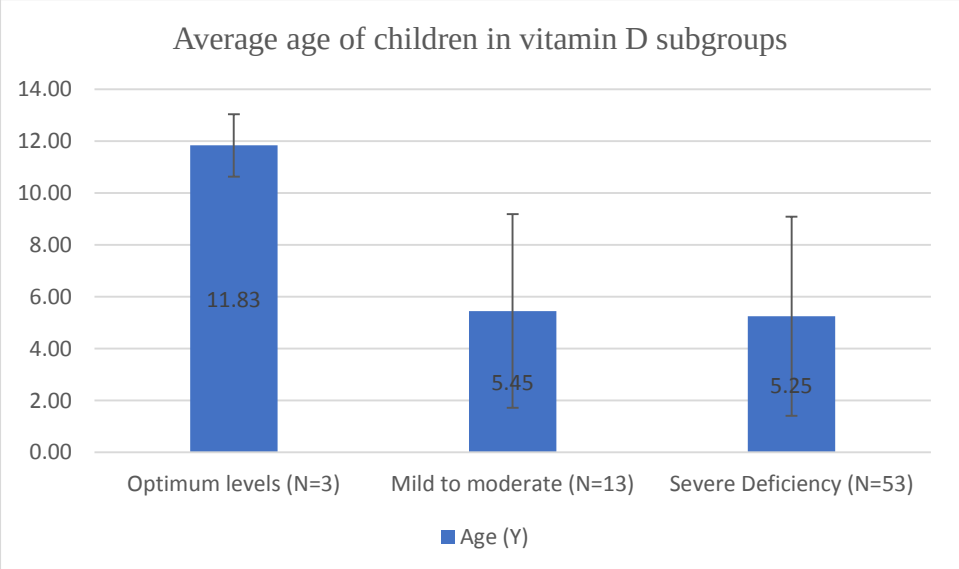


Clinical Presentation	All (N=69)	
	Number	%
bowing of legs	22	31.9
delayed milestones with delayed dentition	1	1.4
difficulty in walking	11	15.9
Seizures in vitamin d deficiency secondary to hypocalcaemia	11	15.9
frontal bossing	12	17.4
motor delay	1	1.4
pain in both knees	1	1.4
short stature	8	11.6
swelling over epiphyseal region of wrist and ankle joints	1	1.4
widening of wrist joints	1	1.4



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Clinical Presentation in SerumVitamin D (ng/dl) levels					
Clinical presentations		level S.VitD (ng/dl)			Total
		Optimum levels (≤10) (N=3)	Mild to moderate (10.1-20) (N=13)	Severe Deficiency (above 20) (N=53)	
Bone deformities (N=56)	Number	3	11	42	56
	%	100.0	84.60	79.2	81.2
Neurodevelopmental Presentation (N=13)	Number	0	2	11	13
	%	0.0	15.4	20.8	18.8

Discussion

Vitamin D deficiency is thought to be widespread, both in areas with lots of sunshine and in countries with limited sunshine. However, it is a nutritional deficiency that is both inadequately detected and treated widely. No matter their age, gender, or location, children around the world have low vitamin D levels, according to a number of studies.

According to the most recent IAP recommendations, cutoffs were used in our study to treat vitamin D deficiency. We conducted our investigation using the vitamin D levels of 69 children in a tertiary care centre.

It was believed that concentrations higher than 20ng/dl were ideal. Mild to moderate vitamin D deficiency was defined as levels between 10 and 20 ng/dl, while severe deficiency was characterised as levels of insufficiency that were fewer than 10 ng/dl. Only three children out of the total study group had ideal levels, with 53 children in our study falling into the category of severe deficiency and 13 falling into the category of mild to moderate deficiency. Kadam et al. did a similar school-based analysis on the prevalence of vitamin D insufficiency in Pune in 2011 and found a prevalence of 34.2%. Similar age group research showed 81% and 80% incidences of vitamin D deficiency, respectively, in the Himachal Pradesh districts of Kullu .

Vitamin D aids in the absorption of calcium by our bodies and the maintenance of strong bones. Numerous studies have found a connection between low vitamin D levels and calcium. The prevalence rates reported in community-based Indian studies completed over the past 10 years on children who appeared to be in good health ranged from 50% to 94%, with the exception of one study that found a prevalence of 34.5%, which is presumably attributed to the low cutoff.

These studies, which examined a range of age groups, highlight the prevalence of vitamin D deficiency in India. Additionally, they demonstrate how little knowledge exists on the significance of vitamin D levels and how they impact children's physical and neurological health. Everywhere in the country, the frequency was high. The high rates of vitamin D insufficiency in children in India are caused by a number of factors, including:

• Children's increased use of indoor activities, which reduces their exposure to sunlight. Children's current lifestyles, where they spend the majority of their time playing on computers, are mostly to blame for this.

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• UV rays from pollution can interfere with the skin's ability to synthesise vitamin D.
Children who consume a lot of fibre have higher levels of phytates and phosphates, which can lower vitamin D levels and increase demand
. • Changing eating patterns contribute to poor dietary calcium and vitamin D consumption.

According to Lee et al. (19), who conducted a prior study on the vitamin D levels of Korean children, the mean blood level of 25(OH) D in 2,880 kids and teens was 17.428.95 ng/mL. Another study found that 1,212 kids between the ages of 4 and 15 had a prevalence of vitamin D insufficiency of 58.6% (measured as 25(OH)D20 ng/mL) (20). These outcomes are in line with those of our study on kids.

Serum 25(OH)D levels below 10 ng/mL are considered the lowest cutoff for determining vitamin D status globally (15). There are instances where rickets can develop in newborns and young children with vitamin D levels higher than 10 ng/mL, though (3,22). According to the US IOM, adequate serum 25(OH)D levels for bone health were over 20 ng/mL. In a published guideline, the Endocrine Society Task Force defined vitamin D adequacy as a serum 25(OH)D level greater than 30, vitamin D insufficiency as a level between 20 and 30, and vitamin D deficiency as a level below 20.

To avoid rickets and keep vitamin D levels at or above 20 ng/mL, the AAP advises that all newborns, kids, and teenagers consume 400 international units of vitamin D daily. To make up for the inadequate transfer of maternal vitamin D storage and to achieve vitamin D levels of > 20 ng/ml, term newborns should get supplements of 400 to 800 units per day. Because preterm newborns receive less vitamin D from their mother's placenta because of their prematurity, it has been found that their vitamin D levels are lower. As a result, they should take a vitamin D supplement.

AAP released a paper in 2013 demonstrating that enterally fed preterm newborns require calcium and vitamin D supplements. They advise supplementing with 200 to 400 units of vitamin D per day for very low birth weight newborns (less than 1500 g) and 400 units per day for infants weighing more than 1500 g. The preterm population's target vitamin D concentration (>20 ng/mL) is the same as for full-term newborns.

Even while literacy rates are rising, nothing is known about how to prevent vitamin D insufficiency. This may be mostly caused by decreased sun exposure, greater sunscreen lotion use, Indian dietary preferences, and decreased use of foods fortified with vitamin D.

All these are indicators that its high time we take appropriate public health action. The following measures can be taken to reduce the burden of the disease.
The finest food augmentation is vitamin D. Milk of any grade can be fortified. Butter, infant formulae, curd, yoghurt, and other dairy products can all be fortified with vitamin D, and they should all be inexpensive for everyone to purchase.
• Informational campaigns to raise public awareness of vitamin D insufficiency.
• Vitamin D supplements ought to be offered at the PHC level

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• Teaching school-age children the importance of a healthy lifestyle and enough vitamin D intake, providing vitamin D-fortified foods at school lunches, and engaging in regular physical activity that exposes them to sunlight are all beneficial.
• Those at a high risk of developing clinical Vitamin D deficiency should have cheap access to testing facilities for this vitamin.
Conclusion: The aforementioned findings highlight the fact that most youngsters were forced to spend several months indoors owing to COVID, which resulted in a vitamin D shortage in them. It also emphasises the need for routine testing of children for vitamin D levels and other micronutrients, as well as the necessity of encouraging kids to obtain some sun exposure in order to naturally replenish their vitamin D levels and supplementing them as needed to ensure adequate levels.
Conflict of interest : none
Funding : none
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