CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

Available online at: http://www.iajps.com Research Article

DEFICIENCY OF VITAMIN "D" AND ITS ASSOCIATION WITH ONSET OF RICKET IN THE LIGHT OF INADEQUATE SUN EXPOSURE, VIT-D FORTIFIED DIET AND BETTER DIETARY HABITS

[1]Dr. Hasan Raza Khan, [2]Dr. Yusra Ejaz, [3]Dr. Jamshaid Ahmad

[1]Medical Officer, BHU Mirdad Muafi

[2]RHC Habib Abad Kasur

[3]Medical Officer, Mandi Ahmadabad, Okara

Abstract:

Objective: *We aimed at the frequency determination of deficiency of Vitamin "D" in children diagnosed with rickets.*

Methods: *Our descriptive case series research was carried out on five years of children in the duration of six months at Services Hospital, Lahore (Pediatrics Department) from November, 2016 to May, 2017. All the children who were diagnosed with rickets were included in this research but Vit-D intake cases were not included. Informed consent and ethical approval were met as necessary formalities. Every child was screened for blood sugar to validate the level of Vit-D (25 [OH] D). We labelled the vitamin "D" serum level which was under (20 ng/ml) as (25 [OH] D) rickets deficiency. Pre-designed form was used for the collection of information and outcomes were analyzed on SPSS software.*

Results: *Mean age factor of the research participants was (1.5 ± 1) year. In the total 159 cases male to female proportion was as 91 male children (57.2%) and 68 female children (42.8%). Sun exposure frequency was reported as two to three days in a week in 97 children (61.01%); whereas, Vit-D fortified diet was taken by 34 children (21.38%). Vit-D deficiency was reported in 120 children (75.47%).*

Conclusion: *Seventy-five percent Vit-D deficiency was found in the children who were in the age bracket of six-months to five-years.*

Keywords: *Vitamin D (Vit-D), Rickets, Deficiency, Children, Sun Exposure, 25-hydroxy Vit-D (25 [OH] D) and Serum.*

Corresponding author:

Dr. Hasan Raza Khan,

Medical Officer,

BHU Mirdad Muafi

QR code

Please cite this article in press Hasan Raza Khan et al., ***Deficiency of Vitamin "D" And Its Association with Onset of Ricket In The Light Of Inadequate Sun Exposure, Vit-D Fortified Diet and Better Dietary Habits,*** *Indo Am. J. P. Sci, 2018; 05(06).*

INTRODUCTION:

Vit-D is among the fat-soluble vitamins having two types of natural presentations Vit-D2 and D3 respectively ergocalciferol and cholecalciferol [1]. Vit-D3 (cholecalciferol) is synthesizable in epithelial cells of skin through 7-dehydrocholesterol conversion by sun radiations of UV-B [1, 2]. Ergocalciferol is constructed in side yeast and mushrooms and food fortification is taken from its synthetic form including diet supplements. Two stage hydroxylation is carried out after Vit-D ingestion. On arrival in liver it is converted to (25 [OH] D). Occurrence of second hydroxylation takes place in kidney by an enzyme (1-hydroxylase) for the conversion of 25[OH] which is biologically active and (25 [OH] 2D) [1]. There is a hormone like activity in Vit-D used for the function regulation in more than two hundred genes that is necessary for the development and growth of body with calcium absorption regulation and bone resorption [2, 3]. Racket are caused because of Vit-D deficiency; it is a growing bone disease which occurs because of mineralized matrix at growth plates lack in children [1]. There is 15% – 18% prevalence rate of rickets in South East Asia [4]. Rickets also manifest skeletal deformities like wrists widening (66.6%), anterior femur and tibia bowing (8.33%), costochondral junctions widening (36.66%, rachitic rosary) and cranial bones softening (8.33%,) [2, 5]. Globally the major cause of rickets is deficiency of nutritional Vit-D [2]. Vit-D deficient state is generally of (25 (OH) D) serum level below (20 ng/ml) [6, 7]. An author has shown Vit-D deficiency in 82% children; whereas, in another research it has been reported as 47% [8, 9]. Vit-D deficiency was observed in healthy breastfed and nursed children respectively 55% and 45% in a local research [10]. Poor diet, skin covering cultural practices and poverty were major causes of Vit-D deficiency [3].

Vitamin-D deficiency was observed in a number of cases in our setting causing rickets. In the (75% – 80%) hospitalized patients were found Vit-D deficiency as an associated disease which makes it a grave pediatric issue [4]. Numerous research studies have probed it internationally [1, 6, 8]. However, scarce research work has been completed in Pakistan regarding rickets except few [5]. Therefor, our research aimed at the frequency determination of deficiency of Vitamin "D" in children diagnosed with rickets.

SUBJECTS AND METHODS:

Our descriptive case series research was carried out on five years of children in the duration of six months at Services Hospital, Lahore (Pediatrics Department) from November, 2016 to May, 2017. All the children who were diagnosed with rickets were included in this research but Vit-D intake cases were not included. Informed consent and ethical approval were met as necessary formalities. Every child was screened for blood sugar to validate the level of Vit-D (25 [OH] D). We labelled the vitamin "D" serum level which was under (20 ng/ml) as (25 [OH] D) rickets deficiency. Research population was 159 children with deficiency of (25 [OH]D). Both sex children with age limit of six-months to five-years were made a part of research. We included children who presented clinical manifestations of skeletal deformities which include wrists widening; costochondral junctions widening (rachitic rosary); fibula and tibia anterior bowing and cranial bones softening. Whereas, Children using Vit-D supplements were not made a part of this research in the last three months' time. Sample selection was made through non-probability purposive technique of sampling. Questionnaire was given for filling after the completion of research formalities such as informed consent and ethical approval.

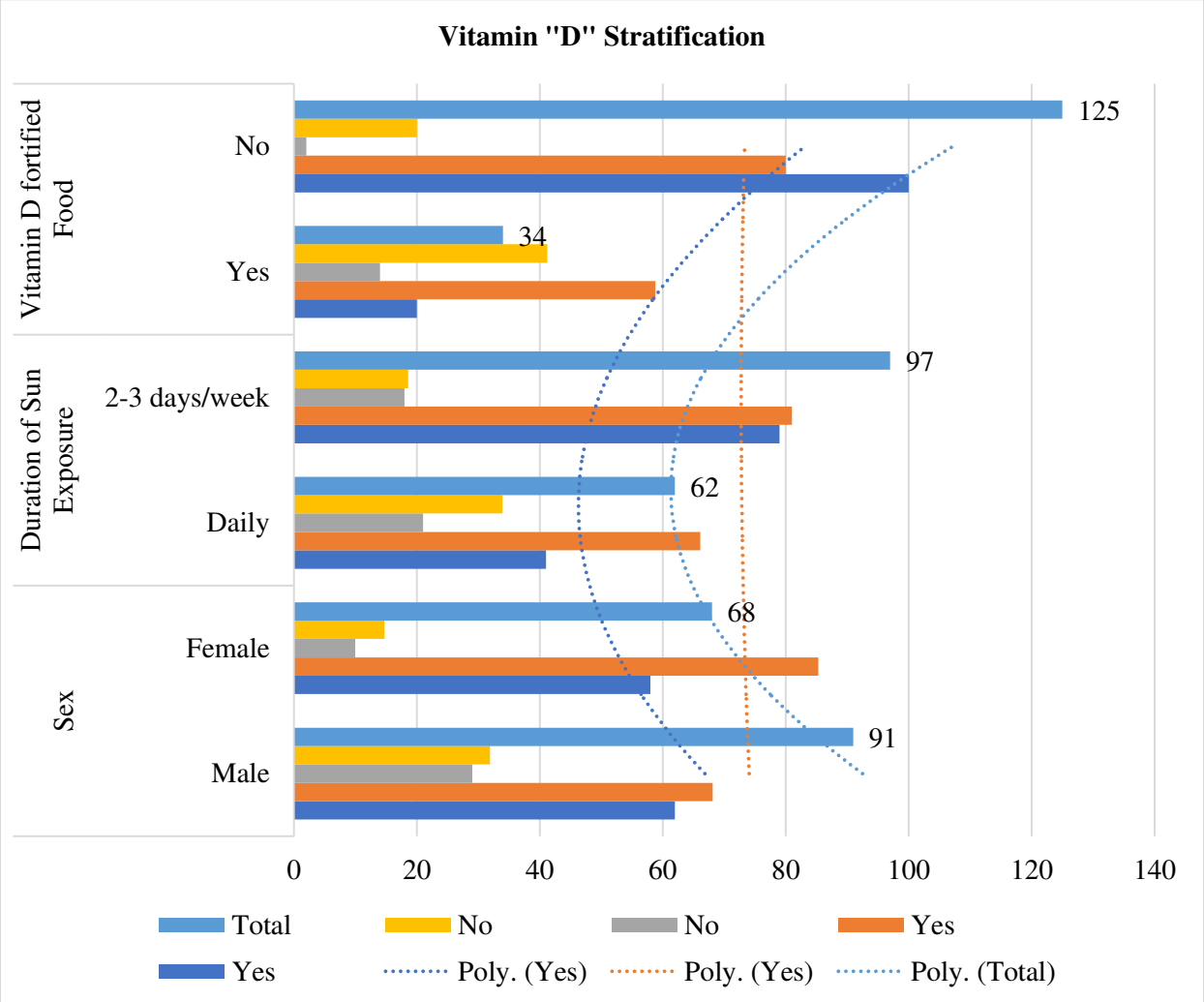
Vit-D deficient children were treated with Vit-D3 I/M stat (6 lac I/U) as Stoss therapy. Data analysis was made through qualitative and quantitative variables and mean, SD, percentage and frequency was calculated about the deficiency of (25 [OH] D). Pre-designed form was used for the collection of information and outcomes were analyzed on SPSS software and Chi-Square Test.

RESULTS:

Mean age factor of the research participants was (1.5 ± 1) year. In the total 159 cases male to female proportion was as 91 male children (57.2%) and 68 female children (42.8%). Sun exposure frequency was reported as two to three days in a week in 97 children (61.01%); whereas, Vit-D fortified diet was taken by 34 children (21.38%) as shown in Table – I. Vit-D deficiency was reported in 120 children (75.47%).

Table – I. Stratification of vitamin D deficiency by sex, duration of sun exposure and vitamin D fortified food

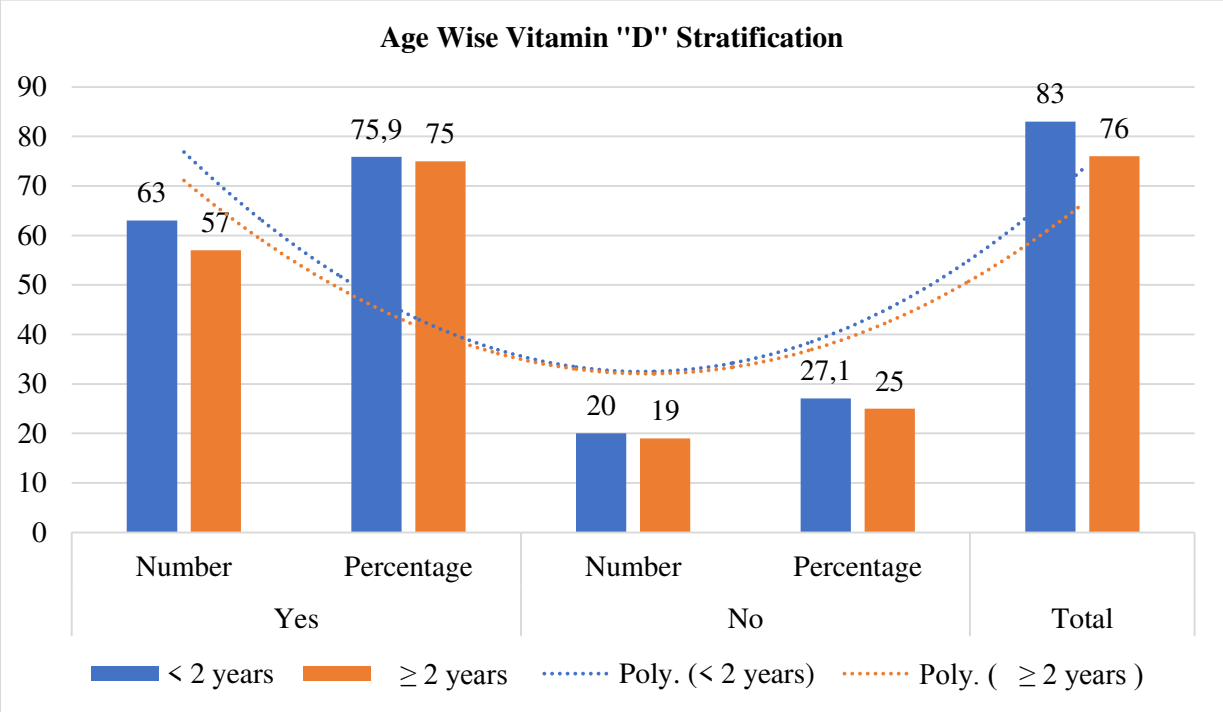
Details		Yes		No		Total	P-value
		Number	Percentage	Number	Percentage		
Sex	**Male**	62	68.1	29	31.9	91	0.01
	Female	58	85.3	10	14.7	68	
Duration of Sun Exposure	**Daily**	41	66.1	21	33.9	62	0.02
	2-3 days/week	79	81	18	18.6	97	
Vitamin D fortified Food	**Yes**	20	58.8	14	41.2	34	0.012
	No	100	80	2	20	125	

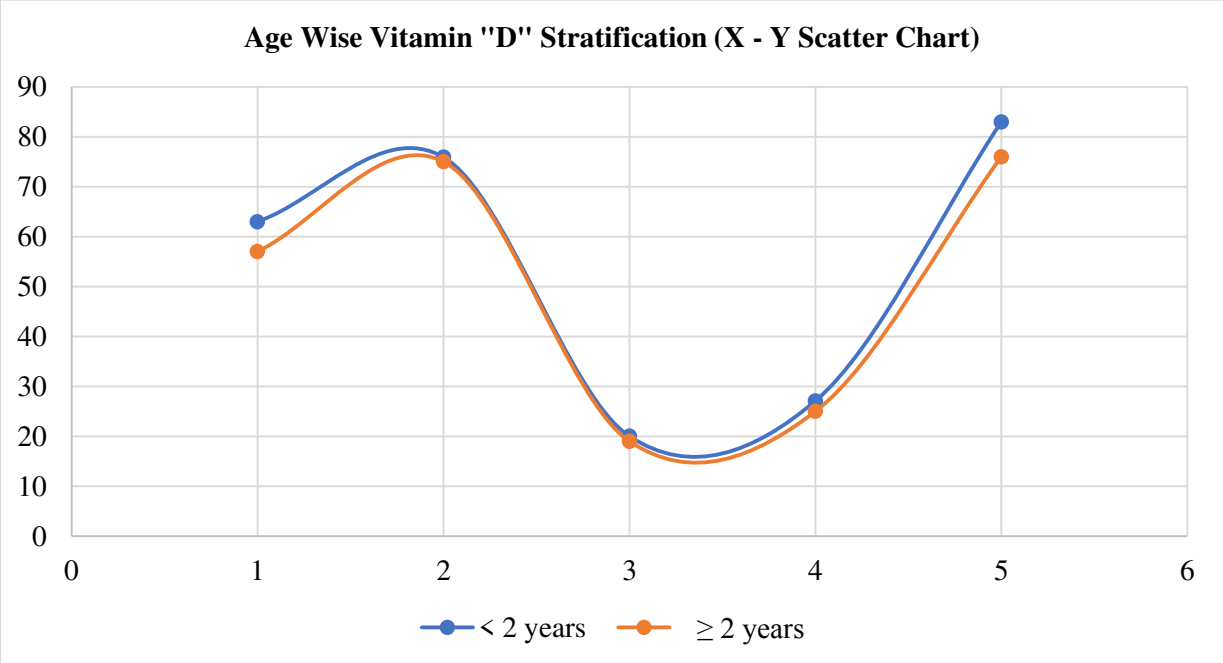


Age wise Vit-D deficiency has been compares in Table – II. There is no statistical significance in the children under and above two years of age (P-value = 0.52); whereas, significant statistical association was in male and female children as (P-value = 0.01), in terms of sun exposure statistically significant (P-value = 0.02). Deficiency of Vit-D in the children being feed with Vit-D fortified food were 58% against the children without Vit-D fortified food as 80% with statistical significant (P-value = 0.012).

Table - II. Stratification of vitamin D Deficiency by age

Age groups	Yes		No		Total
	Number	Percentage	Number	Percentage	
< 2 years	63	75.9	20	27.1	83
≥ 2 years	57	75	19	25	76





DISCUSSION:

Globally, Rickets is a persistent child disease which has become a great concern of many authors in their cross-sectional and retrospective research studies [11 – 14]. In the countries with limited sun exposure such as UK, New Zealand and USA and even in the sunnier areas such as Australia, Saudi Arabia and Africa Vit-D deficiency has been reported [14 – 17]. Common risk factors include low altitudes, less sun shine, dark skin and breast-feeding [18]. We observed male gender, inadequate Vit-D intake and sunlight as factors of risk.

Vit-D deficient state was declared (25 (OH) D) under (20 ng/ml) by Lips and Holick [6, 7]. An Indian research reported Vit-D deficiency in 82% children; whereas, another research reported it 47% which was carried out multiple countries including Pakistan, Somali and Turkey [8, 9]. In a research held in Karachi it was observed that in the healthy children who were breastfed the disease incidence was 55%; whereas, the Vit-D deficiency in the mother was reported as 45% [10]. Increased skin coverage because of cultural trends, poor diet and sun exposure was among the common causes of Vit-D deficiency [3].

We observed Vit-D deficiency in 120/159 children (75.47%) which can be compared with a local research where Vit-D deficiency was observed as (80%) [20]. Mean age was also comparable with a local research held in Peshawar (1.5 ± 1) years, in the children under the age of two years [20]. Our research is consistent with an Australian research in terms of male slight higher domination [21]. Gender difference cannot be justified with any evidence and precision. Sun exposure frequency of two to three days was found in 97 cases (61.01%) per week; whereas, in another research sunlight adequacy was reported as (44.7%) [20].

Fortified food of Vit-D was used scarcely which became a significant factor in the Vit-D deficiency as observed in this particular research. No intake of Vit-D fortified diet was observed in 100 children (80%); whereas, other authors also reported the same but as (60%) [22]. According to Munns CF there was an inverse relation of breastfeeding with the level of Vit-D in the children under three years [23]. A local author reported delayed weening history in (60%) children [20]. Significant deficiency of Vit-D has been reported in numerous research studies carried out on newborns and pregnant women [23]. Under three years children have also been studies about rickets because of nutritional risk factors in various research studies [24]. There is a proper evidence of Vit-D deficiency in our research population and as reported in numerous other research studies. Therefore, regular supplementation and screening are mandatory in Vit-D deficient children. Awareness can be spread through various campaigns at public level in order to reduce the Vit-D deficiency in pregnant women and neonates.

CONCLUSION:

Deficiency of Vit-D and its correlation with onset of rickets has become a global healthcare problem and Pakistan is no exception to this problem. Mortality and morbidity are associated with this global issue and also causes burden on the healthcare department. Preventive measures can eliminate or reduce the onset of rickets such as Vit-D fortified diet, sun exposure and better dietary habits. Therefore, high risk groups need proper identification and treatment of Vit-D deficiency and its association with the onset of rickets.

REFERENCES:

1. Karim SA, Nusrat U, Aziz S. Vitamin D deficiency in pregnant women and their newborns as seen at a tertiary care center in Karachi, Pakistan. Int J Gynaecol Obstret. 2011; 112:59-62.
2. Henderson JB, Dunnigan MG, McIntosh WB, Abdul-motaal AA, Gettinby G, Glekin BM. The importance of limited exposure to ultraviolet radiation and dietary factors in the aetiology of Asian rickets: a risk-factor model. Q J Med 1987; 63:413-25.
3. Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP, et al. Evaluation, treatment, and prevention of Vitamin D deficiency: An Endocrine Society clinical practice guideline. J Clin Endocrinol Metab 2011; 96:1911-30.
4. Younas M, Rahim F. A cross-sectional study on epidemiology of Rickets in Pakistani children. J Med Sci 2003; 11:26-32.
5. Munns CF, Simm PJ, Rodda CP, Garnett SP, Zacharin MR, Ward LM, et al. Incidence of vitamin D deficiency rickets among Australian children: an Australian pediatric surveillance unit study. Med J Aust 2012; 196:466-8.
6. Santosh S, Arif F, Raees H. Risk factors for nutritional rickets in Children under 36 months: A Civil Hospital Case Study. PJMD 2013;213-7.
7. Holick MF. Vitamin D deficiency. N Engl J Med 2007; 357:266-81.
8. Lips P. Vitamin D deficiency and secondary hyperparathyroidism in the elderly: consequences for bone loss and fractures and therapeutic implications. Endocr Rev 2001; 22:477-501.

9. Harinarayan CV, Ramalakshmi T, Prasad UV, Sudhakar D. Vitamin D status in Andhra Pradesh: a population-based study. Indian J Med Res 2008; 127:211-8.
10. Madar AA, Stene LC, Meyer HE. Vitamin D status among immigrant mothers from Pakistan, Turkey and Somalia and their infants attending child health clinics in Norway. Br J Nutr 2009; 101:1052-8.
11. Atiq M, Suria A, Nizami SQ, Ahmed I. Vitamin D status of breast-fed Pakistani infants. Acta Paediatr 1998; 87:737-40.
12. Strand MA, Perry J, Jin M, Tracer DP, Fischer PR, Zhang P, et al. Diagnosis of rickets and reassessment of prevalence among rural children in northern China. Pediatr Int 2007; 49:202-9.
13. Haworth JC, Dilling LA. Vitamin D-deficient rickets in Manitoba, 1972-84. CMAJ 1986; 134:237-41.
14. Mylott BM, Kump T, Bolton ML, Greenbaum LA. Rickets in the Dairy State. WMJ 2004; 103:84-7.
15. Weisberg P, Scanlon KS, Li R, Coqswell ME. Nutritional rickets among children in the United States: review of cases reported between 1986 and 2003. Am J Clin Nutr 2004; 80:1697-705.
16. Blok BH, Grant CC, McNeil AR, Reid IR. Characteristics of children with florid vitamin D deficient rickets in the Auckland region in 1998. N Z Med J 2000; 113:374-6.
17. Shaw NJ, Pal BR. Vitamin D deficiency in UK Asian families: activating a new concern. Arch Dis Child 2002; 86:147-9.
18. Karrar ZA. Vitamin D deficiency rickets in developing countries. Ann Trop Paediatr 1998; 18:89-92.
19. Al-Mustafa ZH, Al-Madan M, Al-Majid HJ, Al-Muslem S, Al-Ateeq S, Al-Ali AK. Vitamin D deficiency and rickets in the Eastern Province of Saudi Arabia. Ann Trop Paediatr 2007; 27:63-7.
20. Melamed ML, Kumar J. Low levels of 25-hydroxyvitamin D in the pediatric populations: prevalence and clinical outcomes. Ped Health 2010; 4:89-97.
21. Greenbaum LA. Rickets and hypervitaminosis D. In: Kleigman RM, Behram RE, Jenson HB, Stanton BF, editors. Nelson textbook of pediatrics. Philadelphia: WB Saunders; 2007 p. 253-62.
22. Masood SH, Iqbal MP. Prevalence of vitamin D deficiency in South Asia. Pak J Med Sci 2008; 24:891-7.
23. Haider N, Nagi AG, Khan KM. Frequency of nutritional rickets in children admitted with severe pneumonia. J Pak Med Assoc 2010; 60:729-32.
24. Siddiqui TS, Rai MI. Presentation and predisposing factors of nutritional rickets in children of Hazara Division. J Ayub Med Coll Abbottabad 2005; 17:29-32.