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Research Article

Persisting Problem of Deficiency of Vitamin A in Rural Preschool, Primary School Children

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Received: February 19, 2018; **Published:** April 24, 2018

Abstract

Vitamin A deficiency (VAD) is leading cause of preventable visual impairment in children. It is also an underlying cause for nearly one-fourth of global child mortality associated with measles, diarrhea and malaria.

Objective: Study was done to know symptoms, signs of VAD in preschool, primary school rural children.

Material Methods: Study was done over 6 months in preschool, primary school children near rural institute. School principals/ teachers were contacted for permission. They were also asked about visits of health teams for Vitamin A supplements to children. School principals, teachers informed that there were visits for Vitamin A drops but all children did not get Vitamin A. They informed that some irregular visits did take place but they were not sure whether Vitamin A was given to children or not given. They surely knew that all children never received vitamin A as sometimes there was no Vitamin A. They did not have records of Vitamin A given or not given.

Results: It was revealed that quite a few children had symptoms/signs of VAD. Twenty (51.28%) of 39 female, 25 (50%) of 50 male children of 3 - ≤ 6 years, 100 (45.87%) of 218 male, 140 (58.33%) of 240 female children of 6 - ≤ 9 years and 100 (55.55%) of 180 male, 82 (49.10%) of 167 female children of 10 - 12 years had VAD. There was not much of a difference in VAD between 3 to12 years age.

Of 45 children of 3 - ≤ 6 years, 24 (53.33%) of nuclear. 24 (54.54%) of 44 from joint families had VAD. Between age ≥ 6 - ≤9 years 120 (50.00%) of 240 children of nuclear, 118 (54.12%) 218 joint families had VAD. Between ≥ 10 - 12 years, 111 (52.11%) of 213 children from nuclear and 70 (50.72%) of 138 children of joint families had VAD again, no difference in nuclear and joint families.

Conclusion: Present study of knowing burden of VAD in preschool, primary school children revealed that quite a few had symptoms/ signs of VAD. Better system of providing vitamin A to rural children is needed till the time rural children can have sufficient Vitamin A in their diet.

Keywords: *Rural children; Vitamin A Deficiency; Effects*

Background

Vitamin A, which refers to a family of compounds, also called retinoids, that exhibit structural and biochemical similarity to retinol, the form of dietary vitamin A absorbed from animal and plant sources [1], is an essential nutrient needed in small amounts for embryonal development, visual, immune functions, maintenance of epithelial cellular integrity, growth and development [2,3]. In the past four decades synthetic analogs of vitamin A, retinoid have been extensively developed and used for clinical treatment of dermatological disorders and a number of cancers [4]. Lack of vitamin A has been linked to several disorders, night blindness, risk of asthmatic attacks, reduced immunity and many others. Yirka reported that reduction in Vitamin A and immunity showed a corresponding reduction in innate lymphoid cells

2 (LL2), but an increase in innate lymphoid cells 3 (LL3). Reduction in LL2 seemed to reduce the effectiveness of an immune response. However it was not clear, whether boosting vitamin A in the diets of malnourished people could put them at greater risk of contracting parasitic infections [5]. VAD (Vitamin A deficiency) is the leading cause of preventable visual impairment in children and their mortality morbidity. Preschool children are the most at-risk segments of the community. According to the recent WHO estimates, VAD has a moderate and severe public health significance, respectively in 45 and 122 countries in the world. About one-third of the world's preschool children were found with sub-clinical VAD, and 0.9% with night blindness. The highest burden of VAD was reported from Africa and Southeast Asia [3]. Africa alone contributed to more than one-third of the global burden of childhood xerophthalmia, Sub-clinical VAD and night blindness, respectively were present in about 44.4% (56.4 million) and 2% of the preschool children [6]. So Vitamin A supplements have been advocated for children of less than 6 years, more so for those with low resources. For rural people with low resources it is too expensive to eat vegetables, fruits or food items with vitamin A. So they are likely to have VAD. So it was decided to check about VAD in rural children.

Objective

Study was done to know the presence of symptoms, obvious signs of VAD in preschool and primary school children of villages near the institute where study was done.

Material Methods

Study was done in preschool, and primary school children, near the rural institute over nearly 6 months. Children of Balwadi (Kinder garden) and primary schools of the villages where rural community based maternal child services were being provided, were the study subjects. With the resources available nurse midwives were visiting each village five times in a year, so that each pregnant woman could be seen at least 3 times during pregnancy for maternal -child care. It was decided to look at whether preschool, primary school children had symptoms and signs of VAD. Balwadi teachers and School principals were contacted for permission. They were also asked whether Vitamin A supplements were given to children. School principals, and teachers informed that there were visits for Vitamin A drops to children but all children did not get Vitamin A Some irregular visits did take place whether Vitamin A was given to children or was not given, they were not sure. But they knew that all the children never received vitamin A and sometimes no one got. They did not have records. So there was no regularity of Vitamin A supplement to children of 3 to 6 years. After permission from parents, it was decided to directly look at symptoms and signs of VAD in preschool and primary school children. There was resource crunch so visits for collecting information related to VAD were clubbed with visits for community based maternal child care visits to 28 villages, 50 - 85 km from the institute. Children of Balwadi (Kinder garden) and primary school up to fourth standard were examined by interns with the help of social worker who was assigned the job. There was mismatch between enrolled children and children who used to regularly come to school. Their age ranged between 3 to ≤ 12 years and a total of 898 children could be asked and seen.

Results

It was revealed that quite a few children had symptoms and signs of VAD. Twenty (51.28%) out of 39 female and 25 (50%) of 50 male children of 3 to less than 6 years had VAD. Amongst >6 - ≤ 9 years, 100 (45.87%) of 218 male and 140 (58.33%) of 240 female children had VAD. Between ≥ 10 - 12 years 100 (55.55%) out of 180 male and 82 (49.10%) of 167 female children had VAD. Of children between 3 to less than 6 years 24 (53.33%) of nuclear and 24 (54.54%) of 44 children of joint families had VAD. Of ≥ 6 - ≤ 9 years 120 (50.00%) of 240 children of nuclear and 118 (54.12%) of 218 of joint families had VAD and of > 10 - 12 years, 111 (52.11%) of 213 children of nuclear and 70 (50.72%) of 138 of joint families had VAD (Table 1-3).

Age		Male/Female			Vitamin A Deficiency				Children with Vitamin A deficiency Male and female	
					Yes		No			
			No	%	No	%	No	%	No	%
≥ 3 - ≤ 6 years		M	50	11.16	025	50.00	025	50.00	045	9.63
No	%									
89	9.00	F	39	8.66	020	51.28	019	48.71		
≥ 6 - ≤ 9 years		M	218	48.66	100	45.87	118	54.12	240	51.39
458	51.00	F	240	53.33	140	58.33	100	41.66		
≥ 10-12 years		M	180	40.17	100	55.55	080	44.44	182	38.98
351	39.00	F	167	38.00	082	49.10	089	50.89		
Total 898		M	448	49.88	M = 225	52.25	M = 223	47.75	467	100.00
		F	450	50.12	F = 242	47.75	F = 208	52.25		
Grand total 898			898	100.0	467	52.00	431	48.00		

Table 1: *Age and Sex, Vitamin A Deficiency.*

Age			Occupation of Family	Vitamin A deficiency		Total		Total children with Vitamin A deficiency male female	
Children		Parents Age	Yes	No	No	%	No	%	
≥ 3 - ≤ 6		20 - 29	Farmer	15	15	030	33.70	045	9.63
No	%		Labourer	15	15	030	33.70		
89	10.00		Annual wager	15	14	029	32.58		
			Total	45	44	089	100.0		
≥ 6 - ≤ 9		30 - 44	Farmer	80	58	138	27.94	240	51.39
No	%		Labourer	75	75	150	31.22		
458	51.00		Annual wager	85	85	170	41.48		
			Total	240	218	458	100.0		
≥ 10 - ≤ 12		≥ 45	Farmer	60	58	118	33.61	182	38.97
No	%		Labourer	80	73	153	43.58		
351	39.00		Annual wager	42	38	080	22.79		
			Total	182	169	351	100.0		
Grand total 898			Total	467	431	898		467	100.00

Table 2: *Age, Occupation of family.*

Age		Family Nuclear and Joint			Vitamin A Deficiency				Total Children Vitamin A deficiency male female	
					Yes		No			
			No	%	No	%	No	%	No	%
≥ 3 - ≤ 6 years		Nuclear	045	7.89	024	53.33	021	46.66	048	10.27
No	%									
89	10.00	Joint	044	13.41	024	50.00	020	50.00		
≥ 6 - ≤ 9 years		Nuclear	240	42.10	120	50.00	120	50.00	238	50.96
458	51.00	Joint	218	66.46	118	54.12	100	45.87		
≥ 10-12 years		Nuclear	213	37.36	111	52.11	102	49.76	181	38.77
351	39.00	Joint	138	42.07	070	50.72	068	49.27		
Total 898		Nuclear	570	63.58	N= 255	52.80	N= 243	47.36	467	100.00
		Joint	450	50.12	J = 212	50.60	J = 188	49.08		
Grand total 898			898	100.0	467	52.00	431	48.00		

Table 3: *Age and Type of Family.*

Twenty six (56.52%) of 46 male children of 3 to less than 6 years had VAD. Four (8.69%) had Xerophthalmia, 4 (8.69%) Bitot spots, 4 (8.69%) Corneal xerosis, 4 (8.69%) Keratomalacia and 4 (8.69%) Night blindness. Twenty (46.51%) of 43 female children of 3 to less than 6 years had VAD. Six (13.95%) had Xerophthalmia, 4 (9.30%) Bitot spots, 3 (6.97%) Corneal xerosis, 6 (6.97%) Keratomalacia and 4 (9.30%) Night blindness One hundred twenty three (52.78%) out of 233 male children of ≥ 6 - ≤ 9 years had VAD, One hundred ten children (47.21%) had Xerophthalmia, 28 (12.01%) Bitot spots, 25 (10.72%) Corneal xerosis, 25 (10.72%) Keratomalacia, 25 (10.72%) Night blindness. Out of 175 male children of ≥ 10 - 12 years, Fifteen children (8.57%) had VAD. 15 (8.57%) had Xerophthalmia, 18 (10.28%) Bitot spots, 20 (11.42%) Corneal xerosis, 17 (9.17%) Keratomalacia and 18 (10.28%) Night blindness (Table 4).

Age Sex	Vitamin A deficiency		Xerophthalmia	Bitot spots	Corneal xerosis	Keralo-malacia	Night Blindness	Total Vitamin A deficiency male and female	
	Yes No %	No No %	No %	No %	No %	No %	No %	No	%
≥ 3 -≤ 6 years No % 89 10.00 Mch 46	26 56.52	20 43.47	4 8.69	4 8.69	4 8.69	4 8.69	4 8.69	46	9.85
Fch 43	20 44.51	23 53.48	6 13.95	6 13.95	6 13.95	6 6.97	6 13.95		
≥ 6 - ≤ 9 year 458 51.00 Mch 233	123 52.78	110 47.21	25 10.72	28 12.01	25 10.72	25 10.72	20 8.58	245	52 .47
Fch 225	122 53.33	103 46.46	24 9.41	23 10.22	25 11.11	24 9.41	24 9.41		
≥ 10 - ≤ 12 years 351 39.00 Mch 175	88 50.28	88 50.28	15 8.57	18 10.28	20 11.42	17 9.71	18 10.28	176	37.68
Fch 176	88 50.00	88 50.00	16 9.09	18 10.22	16 9.09	20 11.36	18 10.22		
Grand total 898	467 52.00	431 48.00						467	100.00

Table 4: *Age Vit " A" Deficiency.*

Discussion

Malnutrition continues in children of low resource settings, specially in rural communities. While something is being done about calories through cereals by giving khichdi, under 'School meals' program, hardly anything has been done for minerals and vitamins. Vegetables and fruits are not eaten at home as they are too expensive for villagers living with poverty. Further ignorance increases their problems and they suffer. VAD is one of the most common micronutrient deficiencies and is associated with various problems. In a study it was revealed that type 3 innate lymphoid cells (ILC3s) were severely diminished in VAD settings, which resulted in compromised immunity to acute bacterial infection. The data indicated that, during malnutrition, a switch to innate type 2 immunity represented a powerful adaptation of the immune system to promote host survival in the face of ongoing barrier challenges. It was left that more research was needed about understanding how vitamin A worked with the immune system because millions of impoverished people in the world suffered from VAD which was a severe public health problem in the study area. In recent years, a growing body of evidence has demonstrated that vitamin A could also regulate metabolic pathways implicated in the pathogenesis of obesity and diabetes [7]. The consequences of VAD were magnified by poverty and the higher prevalence of infectious diseases [8]. It was an underlying cause for nearly one-fourth of global child mortality from measles, diarrhea, and malaria. In a study where 681 preschool children were included, the overall prevalence of xerophthalmia was 8.6% [9]. In the present study also it was revealed that around 50% children had VAD. Nearly 9% in each category of age had xerophthalmia, Keratomalacia, Bitots spots and 10% had night blindness in preschool children of 3 to 6 years and also 6 to 12 years old. There were no differences between 3 - 6 and 6 to 12 years whether they belonged to nuclear family and joint family or male or female children, Eight to 10% children had Bitot spots and night blindness too.

VAD along with measles has been reported to be the major cause of preventable visual impairment in children [10]. Episodes of severe disease due to VAD, a multi-casual disorder were reported to be common by others also [11]. Various studies have revealed relation of poor dietary intake of protein and VAD [12] as well as lack of vitamin-A supplementation, poor immunization status, poor maternal aware-

ness about vitamin-A and high parity [13]. In other studies poor maternal education, socioeconomic status and dietary practices, male sex, and nutritional stunting were some of the factors significantly associated with VAD [14,15]. It has been confirmed that improving the vitamin A status of deficient children reduced the risk of mortality from measles by 50%, from diarrhea by 40%, and overall mortality by 25 - 35% [16]. Therefore, the elimination of VAD was considered a key element for improving the survival, well-being, growth, and development of children. Thus, research showed that the burden and determinants of VAD were of paramount importance for prevention of VAD. Intake of good quality protein and micronutrient are missing in the diet of poor, which is largely cereal based. This deficiency could be addressed by adding pulses, millets, milk, eggs, fruits and vegetables in the food basket of poor [17]. Improving the vitamin A status of preschool-age children prevented child blindness and increased resistance to common infections, In areas where vitamin A deficiency was prevalent, vitamin A supplementation could reduce child mortality by an average 23% [18]. In 2006, India's National Family Health Survey indicated that only 25 percent of under five were benefitting from child survival intervention [19].

The World Health Organization recommended that in vitamin A deficient areas, children 6 - 59 months old should receive a preventive dose of vitamin A supplementation However as of now children above 6 also need to be supplemented [20].

Conclusion

Present study tried to know the burden of VAD in preschool children, primary school children and it was revealed know quite a few had symptoms and signs of VAD.

Acknowledgment

We are grateful to the schools management, the rural children, their parents and the interns.

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Volume 7 Issue 5 May 2018