SHORT ARTICLE

Determinants of Subclinical Vitamin A Deficiency among children 1-5 years in a rural community of Jammu

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Citation

Suri S, Kumar D. Determinants of Subclinical Vitamin A Deficiency among children 1-5 years in a rural community of Jammu. Indian J Comm Health. 2015; 27, 2: 263-269.

Source of Funding : Nil **Conflict of Interest:** None declared

Article Cycle

Submission: 07/05/2015; **Revision:** 09/06/2015; **Acceptance:** 10/06/2015; **Publication:** 30/06/2015

Abstract

Background: The burden of sub-clinical vitamin A deficiency (VAD), as evident by serum retinol levels, is huge (62%) among preschool children in India. Sub-clinical VAD increases children's' susceptibility to infections, reduces physical growth and decreases the ability to survive from serious illnesses. **Aims & Objectives:** To assess the burden of subclinical VAD and study the various risk factors associated with it among children 1-5 years of age. **Material Methods:** A cross sectional community based study was conducted among 750 children selected from 15 villages adopting multistage random sampling from January to December 2011. Heller Keller International Food Frequency Questionnaire (HKI- FFQ) was used to assess intakes of 28 food-items including vitamin A rich foods for the past 7 days. Various risk factors like socio-demographic profile, dietary pattern, vitamin A supplementation and breast feeding patterns were also studied. **Results:** Twelve of the fifteen cluster villages studied were found to be at risk of subclinical VAD. 30.6 % of study subjects had not received even a single dose of Vitamin A. Almost one-third of the subjects had not been breast-fed for the recommended 6 months. Age and socio-economic status were significantly associated with the risk of sub-clinical VAD. Among the dietary factors, consumption of purely vegetarian foods and intake of green leafy vegetables less than thrice a week were significantly associated with enhanced risk of sub-clinical VAD. **Conclusion:** Sub Clinical VAD is a public health problem of wide-spread importance. Dietary diversification along with enhanced coverage of Vitamin A supplementation can tackle the problem of subclinical VAD

Key Words

Food frequency questionnaire; under-five children; vitamin A rich foods; weekly consumption.

Introduction

Vitamin A deficiency (VAD) has long been a major public health concern of low income countries leading not only to a wide range of clinical manifestations but also high burden and severity of infective conditions, which in turn leads to higher mortality in affected populations. Even though overt VAD is not a major public health problem in India at present, sub-clinical VAD is still believed to be of significant public health relevance. Reports suggest that as many as 62 % of our pre-school children may have sub-clinical Vitamin A deficiency (1, 2).

Sub-clinical VAD, is that mild form of Vitamin A deficiency which has not yet presented with the overt clinical manifestations but is none the less detectable by laboratory means. Subclinical VAD is in fact the hidden portion of deficiency submerged below the waterline and even though the severity of outcomes may be less, it may be more rampant than the overt form of the disease. Subclinical VAD is now linked to enhanced susceptibility to infections,

reduced growth potential and to lower chances of survival from illnesses such as ARI, measles and diarrhea (3-7). The findings of this study could play an important role towards planning and implementation of programs to reduce its load.

Aims & Objectives

The present study was undertaken in rural area of Jammu with the following objectives:-

1. Assessment of burden of subclinical VAD among children 1-5 years.
2. To study the various risk factors associated with it.

Material and Methods

The present community based cross-sectional study was conducted in RS Pura block of Jammu district to determine the burden and risk factors associated with subclinical VAD among children 1 to 5 years of age. This study has been conducted according to the standard methodology recommended by Helen Keller International through its Vitamin A Technical Assistance Program. The study tool used is the Helen Keller International Food Frequency Questionnaire (HKI-FFQ); which is a semi-quantitative screening tool and has been validated using serum retinol levels given by WHO (8). Assessment of subclinical VAD was accomplished by using this recall based tool by collecting information regarding the consumption of vitamin A rich foods from individuals. This tool has been found to correlate well with direct laboratory assessment and has hence been used in a number of studies in a variety of settings (9, 10).

HKI-FFQ assesses the frequency of consumption of 28 food items in the past one week (7). Food items included in the original tool constitute staple food, major source of proteins, fats, and major plant and animal sources of Vitamin A. The Vitamin A rich foods included in the tool contain at least 100 Retinol Equivalents (RE)/100 grams (8). HKI-FFQ tool needs to be adapted for the specific population and geographic area to include the locally availability vitamin A rich foods. Eleven of the 28 items are permitted to be replaced, while the others have to be retained even if they are not available locally. This was accomplished by holding several group discussions, and conducting shop surveys with the local population of the study area. Group discussions were held with small groups of 7-12 participants comprising of lay women, health workers, members of Panchayat, women's self-help groups and other village level functionaries. Group discussions as well as shop surveys focused on finding out the availability, cost, general pattern of consumption and cooking practices of locally available vitamin A rich foods. Next, the vitamin A content of identified items was cross-checked from ICMR's Nutritive Value of Indian Foods and items having high concentration (i.e. > 100 RE/100 gm) were included in the modified questionnaire (11).

Inclusion and exclusion criteria - Children aged 1-5 years residing in Block RS Pura were eligible for the study. Children with history of severe illness or hospitalization in the last 1 month were excluded from the study.

Sample Size - The Standard methodology recommended by Helen Keller International was adopted and a total of 750 subjects were studied with 50 subjects drawn from each of the 15 clusters. The population of RS Pura block of Jammu district, the study area, as per the last census was 1,80,560 inhabiting in 198 villages under 8 administrative zones. Multistage random sampling technique was used, wherein zones formed the 1st stage units, villages 2nd stage units and eligible children formed the 3rd Stage unit. Two villages from each of the first seven zones were picked up randomly, while only one village was picked up from the last remaining eighth zone thus providing all the 15 clusters needed for the study. Fifty eligible children were selected randomly from each of the clusters.

Data collection was done by interviewing mothers of eligible participants (or another responsible care-giver) at their place of residence between January to December 2011. However, no data collection was undertaken from May to August 2011 when mangoes were widely available since they are a rich source of Vitamin A for young children and it could lead to an under estimation of the burden of Vitamin A in such communities.

The factors associated with the development of sub-clinical Vitamin A Deficiency were also studied. Among the socio-demographic risk factors, age and gender of the child was enquired. Socio-economic status (SES) of the family was determined using modified Uday Pareek Scale (12). Number of supplementary doses of Vitamin A received by the children was enquired based on the presence of Immunization cards. Breast-feeding practices were noted based on the history provided by the mothers or local guardian.

Ethics and consent - The study protocol was approved by the Institutional Ethics Committee of Government Medical College and Hospital, Jammu.

Written informed consent was taken from the mothers (or another responsible care-giver) of the eligible participants.

Analysis - HKI-FFQ identifies whether sub-clinical VAD is a public health problem in the study population as a whole or not. If mean frequency of consumption of animal sources of vitamin A is less than or equal to 4 days per week or that of combined animal and plant sources (weighted by source, that is, taking the very poor bioavailability of plant sources of vitamin A into account) is less than or equal to 6 days per week, then subclinical VAD prevalence is inferred. If 70% or more clusters have scores below the cut-off values for both criteria, then the entire study area is classified as having subclinical VAD (8).

The data was analyzed using SPSS software for windows (version 11.5). Chi-square test was used to determine the statistical significance of difference in prevalence of subclinical VAD with various risk factors. A probability of less than 0.05 was considered statistically significant. Odds Ratio (95% confidence Interval) was also calculated to find the association between the risk factors.

Results

Table 1 depicts the back-ground characteristics of study population. Of the total 750 children studied, 58.4% were boys and 41.6% were girls. The mean age of study subjects was 33.45 ± 12.7 months. Majority (84.5%) of participants belonged to middle SES as per modified Uday Pareek Scale.

Analysis of the factors associated with sub-clinical Vitamin A deficiency in the study population revealed that age and socio-economic status were significantly associated with the risk of sub-clinical VAD. Though majority (57.44 %) of the subjects with sub-clinical VAD was boys but the results were not statistically significant.

Among the dietary factors, it was observed that consumption of a purely vegetarian diet was significantly associated with increased risk of sub-clinical VAD. It was further observed that consumption of dark green leafy vegetables less than 3 days per week was linked to enhanced risk of subclinical VAD.

Mega-dose Vitamin A supplementation received by subjects was also assessed (Table 2). Nearly one-third (30.6%) of study subjects had not received even a single dose of Vitamin A. Table 3 depicts that vitamin A supplementation in the last 6 months among the study subjects was not significantly associated with socio-economic status.

Analysis of the breast feeding pattern of the study population (Table 4) revealed that almost one-third (30.6%) of the subjects had not been breast-fed for the recommended 6 months, while 7.8% had not received any breast feeding at all. Average duration of breast feeding was 16 months while 15.7% of subjects continued to do so for over 24 months of age.

Table 5 shows that the frequency of consumption of animal sources of vitamin A was low and ranged from 1.7 to 6.1 days/week while the weighted frequency of consumption of combined weighted plant and animal sources ranged from 2.6 to 7.2 days/week. Only 3 cluster villages were considered not to have subclinical VAD of public health significance as per the analysis of HKI-FFQ. Therefore, 12 (80%) of the 15 cluster villages were found exhibit subclinical VAD. From public health point of view, the entire survey area i.e. whole block of RS Pura, Jammu may be considered to have subclinical VAD.

Discussion

The present study conducted in the 15 villages of RS Pura block in Jammu district revealed that boys out-numbered the girls in all the age groups from 1-5 years corresponding to a proportion of 712 boys per 1000 girls which is very close to the child sex ratio in rural areas of Jammu district (776) as per Census of India 2011, thereby revealing an unbiased and representative sample (13).

It was observed that maximum number of children surveyed were in younger age-group (1-3 years). As the age of children increased in the study population, lesser children were available for the study possibly because the older children were attending schools during the study hours.

In the present study it was observed that the propensity to develop subclinical VAD was higher among younger age group (1-3 years) and the risk reduced as the age advances. The results obtained in our study are concordant to those reported by Jiang J *et al* in China and Fawzi *et al*, who observed that children under two years of age were at a greater risk of taking diet poor in Vitamin A (14, 15).

No gender differentials in the intake of Vitamin A rich foods were observed in the present study. Our findings are in conformity to those made by National Nutritional Monitoring Bureau (NNMB) (2). Studies

conducted by other authors, including Demissie *et al* and Laxmaiah A, also suggested similar findings (16, 17).

SES has been found to be significantly associated with increased risk of subclinical VAD in this study. This could be due to the fact that lower SES leads to lower purchasing power to take the required quality and quantity of foods, including vitamin A rich foods. NNMB, Jiang J *et al*, Fawzi *et al* and Laxmaiah A also observed similar results in their studies (2, 14, 15, 17).

The present study revealed that intake of non-vegetarian foods and consumption of green leafy vegetables more than three times a week reduced the risk of subclinical VAD. Jiang J *et al* in their study conducted in China also observed that the children who consumed animal foods and dark green leafy vegetables more than twice a week were less likely to be deficient in Vitamin A levels sub-clinically (14).

We found poor coverage of vitamin A supplementation in our study area which in turn might have contributed to the subclinical deficiency (18). Our findings are in conformity with the finding of NFHS-3 which reports that only 18% of children 6-59 months in this country had received any vitamin A supplements in the last 6 months (19). NNMB in 2004 also reports that only 58% of preschool children had received a dose of vitamin A in the previous year (2).

In our study area, we also observed that breast feeding practices were not optimal. The average duration of breast feeding was 16 months in the study population which is quite low as compared to the average of 22 months as seen in NFHS-3 data of J&K. 7.8% of study subjects had not received any breast feeding at all which is higher than the figures suggested by NFHS-3 in J&K (4.7%) 20. It is quite likely that sub-optimal breast feeding patterns might have contributed to the subclinical VAD.

Analysis of dietary consumption pattern of the study population using HKI FFQ revealed that the whole block of RS Pura was inferred to be affected by subclinical VAD. The problem of subclinical VAD has also been studied by National Sample Survey Organization (NSSO) and their data also suggests that 62% of Indian children suffer from subclinical VAD and this has been corroborated by serum retinol levels. High prevalence of subclinical VAD was attributed to poor dietary intake of vitamin A rich foods with 86% of subjects consuming less than 50% of the RDA and less than one-third of the children receiving vitamin A supplementation (1, 2).

In the present study it was observed that though the intake of plant sources of vitamin A was found to be moderate, this did not help much in the prevention subclinical VAD due to the very low bioavailability of plant sources of vitamin A Khandait noted that nearly 91% of Indian under-six children were consuming dietary vitamin A below recommended levels (21). Narkhade *et al* in their study observed that intake of green leafy vegetables in children 2-3 years and 3-5 years were having deficits to the tune of 87.5% and 85.2% of the RDA, respectively (22).

Conclusion

The present study reiterates the fact that sub-clinical VAD exists as a public health problem in the study area. Young children, low SES, poor dietary intake of Vitamin A rich foods, low coverage of Vitamin A supplementation, poor breast feeding patterns have been observed to be important determinants of subclinical VAD.

Recommendation

Increased accessibility to Vitamin A rich foods along with nutrition education campaigns can tackle the problem of subclinical VAD. Dietary diversification along with enhanced coverage of Vitamin A supplementation is the need of the hour.

Limitation of the study

The principle weakness of the study was inability to perform estimation of serum retinol level due to lack of facilities and financial constraints.

Relevance of the study

Subclinical VAD still exists as a public health problem due to poor dietary intake of Vitamin A rich foods, along with low supplementation of vitamin A doses among under-five children.

Authors Contribution

SS: Conception, design, acquisition of data, analysis and interpretation of data. Drafting of the manuscript and critical revision of the manuscript. DK: Accountable for all aspects of the work in ensuring that accuracy or integrity of the work are appropriately investigated and resolved

References

1. National Nutrition Monitoring Bureau. Diet and nutritional status of population and prevalence of hypertension among adults in rural areas. National Institute of Nutrition, Indian Council of Medical Research. Hyderabad;2006. Technical Report No: 24

2. National Nutrition Monitoring Bureau. Prevalence of Vitamin A deficiency among pre-school children in rural areas. National Institute of Nutrition, Indian Council of Medical Research. Hyderabad;2006. Technical Report No: 23
3. World Health Organization. Global prevalence of Vitamin A deficiency in populations at risk 1995-2005. WHO Global Database on Vitamin-A Deficiency. Geneva:WHO Press;2009
4. Akhtar S, Ahmed A, Randhawa MA, Atukorala S, Arlappa N, Ismail T, Ali Z. Prevalence of vitamin A deficiency in South Asia: causes, outcomes, and possible remedies. J Health Popul Nutr. 2013 Dec;31(4):413-23. Review. PubMed PMID: 24592582; PubMed Central PMCID: PMC3905635.[PubMed]
5. Samba C, Gourmel B, Houze P, Malvy D. Assessment of vitamin A status of preschool children in a sub-Saharan African setting: comparative advantage of modified relative-dose response test. J Health Popul Nutr. 2010 Oct;28(5):484-93. PubMed PMID: 20941900; PubMed Central PMCID: PMC2963771.[PubMed]
6. Laxmaiah A, Nair MK, Arlappa N, Raghu P, Balakrishna N, Rao KM, Galreddy C, Kumar S, Ravindranath M, Rao VV, Brahmam GN. Prevalence of ocular signs and subclinical vitamin A deficiency and its determinants among rural pre-school children in India. Public Health Nutr. 2012 Apr;15(4):568-77. doi: 10.1017/S136898001100214X. Epub 2011 Sep 2. PubMed PMID: 21884647.[PubMed]
7. Arlappa N, Laxmaiah A, Balakrishna N, Harikumar R, Brahmam GN. Clinical and sub-clinical vitamin A deficiency among rural pre-school children of Maharashtra, India. Ann Hum Biol. 2008 Nov-Dec;35(6):606-14. doi: 10.1080/03014460802380778. Erratum in: Ann Hum Biol. 2010 Apr;37(2):282. PubMed PMID: 18958633.[PubMed]
8. Rosen DS, Haselow NJ, Sloan NL. How to use the HKI food frequency method to assess community risk of Vitamin A deficiency. 1993. Available from:http://65.181.121.234/research/HKI%20Food%20Frequency%20Method%20of%20Vit%20A%20Deficiency.pdf (Last Assessed on 2015 March 3)
9. Shiundu KM, Oiye S, Kumbe M, Oniango R. Provision of Vitamin A through utilization of local food materials in rural parts of western Kenya. AJFAND. 2007;7(2)
10. Oiye SO, Shiundu KM, Oniang'o RK. The contribution of african leafy vegetables (AVLs) to vitamin A intake and the influence of income in rural Kenya. AJFAND. 2009;9(6):1309 – 1323
11. Bhardwaj P, Thareja S, Prakash S, Saraya A. Micronutrient antioxidant intake in patients with chronic pancreatitis. Trop Gastroenterol. 2004 Apr-Jun;25(2):69-72. PubMed PMID: 15471319.[PubMed]
12. Pareek U, Trivedi G. Manual of socio-economic status scale (rural). New Delhi:Manasayan Publishers;1995
13. Office of the Registrar General and Census Commissioner, India. Census of India 2011. India:Ministry of Home affairs;2011
14. Jiang JX, Lin LM, Lian GL, Greiner T. Vitamin A deficiency and child feeding in Beijing and Guizhou, China. World J Pediatr. 2008;4(1):20-25[PubMed]
15. Fawzi WW, Herrera MG, Nestel P, el Amin A, Mohammed KA. Risk factors of low dietary vitamin A intake among children in the Sudan. East Afr Med J. 1997 Apr;74(4):227-32. PubMed PMID: 9299823.[PubMed]
16. Demissie T, Ali A, Mekonnen Y, Haider J, Umeta M. Demographic and health-related risk factors of subclinical vitamin A deficiency in Ethiopia. J Health Popul Nutr. 2009 Oct;27(5):666-73. PubMed PMID: 19902803; PubMed Central PMCID: PMC2928083.[PubMed]
17. Laxmaiah A, Nair MK, Arlappa N, Raghu P, Balakrishna N, Rao KM, Galreddy C, Kumar S, Ravindranath M, Rao VV, Brahmam GN. Prevalence of ocular signs and subclinical vitamin A deficiency and its determinants among rural pre-school children in India. Public Health Nutr. 2012 Apr;15(4):568-77. doi: 10.1017/S136898001100214X. Epub 2011 Sep 2. PubMed PMID: 21884647.[PubMed]
18. Semba RD, de Pee S, Sun K, Bloem MW, Raju VK. The role of expanded coverage of the national vitamin A program in preventing morbidity and mortality among preschool children in India. J Nutr. 2010 Jan;140(1):208S-12S. doi: 10.3945/jn.109.110700. Epub 2009 Nov 25. PubMed PMID: 19939992.[PubMed]
19. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey (NFHS-3), 2005-06: India. Mumbai:IIPS;2007
20. International Institute for Population Sciences (IIPS) and Macro International. National Family Health Survey(NFHS-3),India,2005-06:Jammu and Kashmir. Mumbai:IIPS;2009
21. Khandait DW, Vasudeo ND, Zodpey SP, Ambadekar NN, Koram MR. Vitamin A intake and xerophthalmia among Indian children. Public Health. 1999 Mar;113(2):69-72. PubMed PMID: 10355305.[PubMed]
22. Narkhede V, Likhar S, Pitale S, Durge P. Nutritional status and dietary pattern of under five children in urban slum area. Nat J of Comm Med 2011;2(1):143-148

Tables

TABLE 1 BASELINE CHARACTERISTICS OF THE STUDY POPULATION CONSISTING OF CHILDREN 1-5 YEARS IN A RURAL COMMUNITY OF JAMMU

Risk-factors	Subclinical VAD in study Subjects		Chi Square, p value	OR (95% CI)
	Present * N= 484 No. (%)	Absent N= 266 No. (%)		
Age				
1-2 years	114 (23.55)	48 (18.05)	9.38, 0.02	1.73
2-3 years	147 (30.37)	65 (24.44)		1.65
3-4 years	119 (24.59)	77 (28.95)		1.12
4-5 years	104 (21.49)	76 (28.57)		1.00

Sex				
Male	278 (57.44)	160 (60.15)	0 .51,0.47	0.89 (.65-1.22)
Female	206 (42.56)	106 (39.85)		
Socio-economic status				
Upper (Upper, Middle, Upper Middle)	364 (75.21)	223 (83.83)	7.51,0.006	0.58 (.39-.86)
Lower (Lower, Lower Middle)	120 (24.79)	43 (16.17)		
Type of diet				
Vegetarian	315 (65.08)	7 (2.63)	278.3, 0.001	70.56(32.56-152.9)
Non- vegetarian	169 (34.92)	265 (99.62)		
Pattern of diet				
Children who had DGLV <3 days/week	269 (55.58)	116 (43.61)	9.84,0.001	1.61(1.19-2.18)
Children who had DGLV >= 3 days/week	215 (44.42)	150 (56.39)		

TABLE 2 VITAMIN A SUPPLEMENTATION* IN THE STUDY POPULATION CONSISTING OF CHILDREN 1-5 YEARS IN A RURAL COMMUNITY OF JAMMU

S.No.	Vitamin A doses	Boys		Girls		Total	
		N	%	N	%	**N**	**%**
1	No dose	116	(31.2)	80	(29.6)	196	(30.6)
2	Only 1 dose	147	(39.5)	111	(41.1)	258	(40.2)
3	2 doses	95	(25.5)	71	(26.3)	166	(25.9)
4	3 doses	12	(3.2)	5	(1.9)	17	(2.7)
5	4 doses	2	(0.5)	2	(0.7)	4	(0.6)
6	More than 4 doses	0	(0)	1	(0.4)	1	(0.2)

*Percentage calculated out of 642 children. For rest of the 108 children, documented evidence of having received Vitamin A was not available.

TABLE 3 VITAMIN A SUPPLEMENTATION IN THE STUDY POPULATION ACCORDING TO SOCIO-ECONOMIC STATUS

Socio-economic status	Vitamin A supplementation of study subjects*			p value
	Received Vitamin A N (%)	Did not receive Vitamin A N (%)	Total N (%)	
Upper	14 (14.6)	48 (8.8)	62 (9.7)	0.19
Upper middle	26 (27.1)	130 (23.8)	156 (24.3)	
Middle	37 (38.5)	256 (46.9)	293 (45.6)	
Lower middle	17 (17.7)	85 (15.6)	102 (15.9)	
Lower & BPL	2 (2.1)	27 (4.9)	29 (4.5)	

* History of intake of vitamin A supplementation in the last 6 months was calculated

TABLE 4 BREAST FEEDING PATTERN OF THE STUDY POPULATION CONSISTING OF CHILDREN 1-5 YEARS IN A RURAL COMMUNITY OF JAMMU

Breast feeding pattern (months)	Boys N= 438 No. (%)	Girls N=312 No. (%)	Total No. (%)
None	39 (8.9)	20 (6.4)	59 (7.8)
1-6	92 (21.0)	79 (25.3)	171 (22.8)
7-12	81 (18.5)	59 (18.9)	140 (18.7)
13-24	149 (34.0)	113 (36.2)	262 (34.9)
> 24	77 (17.6)	41 (13.1)	118 (15.7)

TABLE 5 FREQUENCY OF CONSUMPTION OF VITAMIN A RICH FOODS FROM PLANT SOURCES VERSUS COMBINED ANIMAL AND PLANT SOURCES (WEIGHTED BY SOURCE) IN 15 CLUSTER VILLAGES

S. No.	Zone	Village	Mean frequency of consumption (days per week)		Sub-clinical Vitamin A deficiency*
			Animal source (a)	Weighted total of animal and plant source (b)	
1	Miran Sahib	Krishna Nagar	4.8	6.0	Yes
2		Maralia	6.0	7.2	No
3	Chakrohi	Chakrohi	2.3	3.3	Yes
4		Nanuwali, Mana	1.7	2.6	Yes
5	Sai	Hara Pir	2.3	3.3	Yes
6		Dher Camp, Fagle	3.5	4.5	Yes
7	Satraiyan	Rangpur	3.0	4.0	Yes
8		Sidhra	3.2	4.2	Yes
9	Dablehar	Dablehar	4.7	5.6	Yes
10		Chakbala	2.2	3.1	Yes
11	Badyal Brahmna	Jasore	3.9	4.7	Yes
12		Karan Basti	5.5	6.6	No
13	Rathana	Kadarpur	3.5	4.5	Yes
14	Simbal Camp	Simbal	6.1	7.1	No
15		Tanda, Mahlowal	4.5	5.1	Yes

* Sc VAD is Yes if a≤4 or b≤6