Assessment of vitamin A deficiency indicators in urban slum communities of National Capital Territory of Delhi

Umesh Kapil, Nandini Saxena, M Srivastava, L Jailkhani, B Nayyar, P Chikkara, S Ramachandran, N Gnanasekaran*

Dept of Human Nutrition and Computer Faculty, All India Institute of Medical Sciences, New Delhi*

A study was conducted to assess the magnitude of Vitamin A deficiency in two urban slum communities of Delhi. Biological and ecological indicators suggested by WHO/UNICEF 1992, were used. Five hundred and fifty two children in the age group of 0-5 years were studied. Data was collected on socio-economic status, breastfeeding pattern, immunisation, morbidity profile and presence of vitamin A deficiency. Height and weight were recorded using standard techniques. Vitamin A intake of subjects was assessed using food frequency and 24 hr recall methods. It was found that 63.9% children >1 year of age were fully immunised. Colostrum was received by only 28.1% of children. Only 32% infants <4 months of age were exclusively breastfed. Breast milk was being received by 93.5% children <6 months old. 18.1% children had diarrhoea within last 15 days of survey. 7.1% children gave history of helminthic infestations. 47.8% children <3 yrs were stunted while 26.9% were wasted. None of the children had Bitot's spots but nightblindness was observed in 1.2% children. 35.7% children (12-24 months) consumed vitamin A rich foods less than once A week. The frequency of consumption of vitamin A rich foods was significantly higher in winter as compared to summer and rainy seasons ($p<0.05$). The mean daily vitamin A intake for 6-11 months and 12-71 months old children was 1187±755 μg and 847±111μg respectively. It was concluded that moderate vitamin A deficiency was present in the study area.

Introduction

Elimination of blindness due to vitamin A deficiency (VAD) by the year 2000 AD is one of the National Nutrition goals[1]. The National Programme for Prevention of Nutritional Blindness has been functioning for the last 20 years in India[2]. However, vitamin A deficiency continues to be a major public health problem[3,4]. A joint WHO/UNICEF consultation of control of vitamin A deficiency (1992) suggested specific biological and ecological indicators for assessing the magnitude of VAD in a population[5]. The present study was conducted to assess the magnitude of VAD in urban slum communities of Delhi using these indicators.

Materials and method

The study was conducted in two urban slums of National Capital Territory (NCT) of Delhi. A total population of 7000 constituted the study population. All families with 0-5 years old children were enlisted and every alternate family was covered for the survey. Thus, 552 children were studied in detail.

Tools for data collection

A pretested semi-structured questionnaire cum interview schedule was administered to mothers of all the subjects to elicit information of socio-demographic profile, awareness about vitamin A deficiency, breast feeding status, immunisation status, current and past morbidity of the children and taboos related to vitamin A rich foods.

The frequency of consumption of vitamin A rich foods by the households and by the children for last one year was assessed using food frequency questionnaire. The information on frequency of consumption of vitamin A rich food within last 7 days was also obtained. Dietary intake of children was assessed using 24 hour recall method by interviewing the mothers. The raw amounts of food cooked by the family, volume of the cooked food and the volume consumed by the index child was inquired using standardised utensils. Raw amounts consumed by the child were derived from the above information[6]. Mean daily vitamin A intake of index child was calculated using computer software based on food composition tables. Nutritional status of children was assessed by anthropometric measurements viz weight and height/length using standard techniques[7]. Malnutrition was classified using -2SD of the NCHS reference values as the cut-off[8].

Observation method was used to detect presence of Bitot's spots. Nightblindness amongst children >2 years was assessed by asking a set of pretested questions from the mothers.

Biological and ecologic indicators suggested by joint WHO/UNICEF consultation[5] derived from the collected information were used to assess the magnitude of VAD in the study population.

Results

The present study was conducted on a total of 552 children in the age group of 0-5 years. The age and sex distribution of the subjects is presented in Table 1.

The mean per capita monthly income of the families was found to be Rs. 468 ± 342 indicating low socio-economic status of the population. Local terminology for night blindness was known to nearly 75% of the families studied.

Correspondence address: Dr. Umesh Kapil, Additional Professor, Human Nutrition Unit, All India Institute of Medical Sciences, New Delhi, 110029 India
Tel: +91-11-661-123 x 3383 x 4632 Fax + 91-11-686-2663

Table 1. Age and sex distribution of the subjects.

Age (months)	Male	Female	Total
0-5	14 (5.3)	22 (7.6)	36 (6.5)
6-11	38 (14.5)	39 (13.5)	77·(13.9)
12-23	50 (19.1)	59 (20.3)	109 (19.8)
24-35	50 (19.1)	65 (22.4)	115 (20.8)
36+	110 (41.9)	105 (36.2)	215 (38.9)

Note: figures in parentheses denote percentages.

The prevalence of vitamin A deficiency indicators in the study population are presented in Tables 2 and 3.

Table 2. Biological and Nutrition related indicators of Vitamin A deficiency.

Indicator	Prevalence suggested for identifying VAD	PS* Prevalence
Bitot's spots	>0.5%	0
Night blindness (24-71 months)	>1%(mild) 1% - <5% (moderate) > 5% (severe)	1.2%
% children (12-24 months) consuming vitamin A rich foods once a week	<75%	64.3%
% children (<6 months) not receiving breast milk	>50%	6.5%
Full immunisation coverage at 12 months of age	<50%	63.9%
Diarrhoeal disease rate	>20%	18.1%

* PS = Present Study

Table 3. Prevalence of other suggested indirect indicators of Vitamin A deficiency in the study area.

Indicator	Prevalence suggested for identifying VAD	PS* data
Anthropometric		
stunting in children <3 yr	>30%	47.8%
wasting in children <5 yr	>8%	26.9%
% households consuming vitamin A rich food > 3 times/week	<75%	30.5%
Market Availability (DGLV)	<6 mo/yr	11.2(mo/yr)
% children (12-71 months) consuming vitamin A rich foods <3 times/week	>75%	73.3%
Helminthic infestations	>50%	7.1%

* PS = Present Study

It was found that 63.9% of children, more than one year of age, were fully immunised against tuberculosis, diphtheria, pertussis, tetanus, poliomyelitis and measles. An episode of diarrhoea within last two weeks of the survey was reported in 18.1% of children. 7.1% of children gave history of passage of worms in stool within last 2 days.

Colostrum was received by 28.1% of the children studied. The exclusive breastfeeding rate was 0.32. Nearly 94% children under six months of age were breastfed on the day of survey.

52.1% of children above one year of age had received at least one megadose of Vitamin A while 41.5% children had received Vitamin A megadose within last six months of the survey.

Anthropometric data revealed that 47.8% children below three years of age were stunted while 26.9% of all the children were wasted.

No clinical signs of VAD ie Bitot's spots and corneal scars were found amongst the subjects. However, the prevalence of nightblindness was 1.2% in the children above two years of age.

The dietary data revealed that the mean daily vitamin A intake of children (6-12 months and 13-72 months) was 1187 ±7 55 µg and 841 ± 111 µg respectively. Nearly 55% children showed an intake deficit of >60% as compared to the RDA for their age. A higher deficit in intake was observed as the age of the children increased.

It was found that 35.7% of children 12-24 months were not consuming Vitamin A rich foods even once a week. Nearly 73% of children in the age group 12-71 months consumed Vitamin A rich foods less than three times per week.

69.5% household prepared Vitamin A rich foods less than three times per week. Of the concurrent market survey, it was found that dark green leafy vegetables (DGLVs) were available for 11 months of the year.

The pattern of consumption of Vitamin A rich foods for the past year was enquired and the data revealed that the frequency of consumption of vitamin A rich foods in the households varied in different seasons, with significantly higher consumption in winters as compared to summers and rainy seasons ($p<0.05$). The price of DGLVs was also found to be minimum in winters followed by rainy and summer seasons. No statistically significant difference was found in the frequency of consumption of Vitamin A rich foods in families with or without the young children. No taboos for feeding of Vitamin A rich foods to children were found in the study population.

Discussion

Biological indicators, both clinical and biochemical, are widely used to assess prevalence and severity of VAD and to evaluate the effectiveness of VAD control programmes. However, certain ecological and related indicators, called the 'indirect indicators', have been recommended to identify populations at risk for VAD. These indicators focus of factors responsible for, or which contribute to, the problems of VAD[5].

Although the National Nutrition Monitoring Bureau (NNMB) repeat surveys in India have revealed a 60% decline in the prevalence of Bitot's spots since 1975-78[4], VAD still continues to be a public health problem in the country[5]. In the study area also, the prevalence of nightblindness was 1.2%, indicating a public health problem of moderate level. This indicator was further supported by low frequency of consumption of Vitamin A rich foods by children (above 12 months of age) and by the households.

The anthropometric indicators also pointed to high risk of VAD in the area. The extent of stunting observed in the area was lower than the NNMB data while wasting was higher in the present study[4].

The colostrum receipt and exclusive breast feeding rate were low, 28% and 32%, respectively in the study population. A recent multicentric study in urban and rural

communities has shown similar results in which 20% mothers fed colostrum to newborns while only 5-15% mothers exclusively breastfed their children[9].

The Vitamin A intake of nearly half of the subjects was below 60% of the RDAs. This is reflective of low frequency of consumption of Vitamin rich foods by the children mainly due to low frequency of preparation of these foods in the family.

The frequency of consumption of Vitamin A rich foods by the family was significantly higher during winters as compared to summer and rainy season and this could be due to comparatively higher cost in summers and rainy seasons.

Since the present study was conducted during summer season, the lower frequency of consumption of Vitamin A rich foods could be due to higher price and poor purchasing power of the study population.

In the present study, one biological indicator ie nightblindness was supported by three indirect indicators viz consumption of Vitamin A rich foods less than once a week by children 12-24 months old (63.4%), consumption of Vitamin A rich foods less than three times per week by the households (69.5%), stunting in children below three years of age (47.8%) and wasting in the children (26.9%). It can be concluded that VAD was a public health problem of moderate severity in the study area.

Assessment of vitamin A deficiency indicators in urban slum communities of National Capital Territory of Delhi
Umesh Kapil, Nandini Saxena, M Srivastava, L Jailkhani, B Nayyar, P Chhikara, S Ramachandran, N Gnanasekaran
Asia Pacific Journal of Clinical Nutrition (1996) Volume 5, Number 3:170-172

德里市（Delhi）貧民社區維生素A缺乏的評估

摘要

作者對德里市兩個貧民社區維生素A缺乏進行了評估，他們應用1992年WHO/UNICEF建議的生物和生態指標。作者選了552位0-5歲的兒童爲對象。收集他們的社會經濟狀況、母乳喂養、免疫接種、發病率和維生素A缺乏等數據，用標準法記錄身高、體重。用24小時回憶和食物次數來評估對象的維生素A進食。結果發現大於一歲的兒童均獲得免疫，僅28.1%兒童獲初乳，四個月以下的嬰兒有32%純母乳喂養，六個月以下兒童有93.5%母乳和其它乳類喂養。

18.1%兒童在調查前15天曾患腹瀉，7.1%兒童有蠕虫感染史，47.8%三歲以下的兒童發育障礙，其中有26.9%身體消瘦。沒有發現比托氏班（Bitot's Spots），但有1.2%兒童得夜盲症。35.7%兒童（12-24個月）每週進食維生素A豐富的食物少於一次。進食維生素A豐富食物的次數，在冬季明顯高於夏季及雨季（$p<0.05$）。6-11個月和12-71個月的兒童每日維生素A平均進食量分別爲1187±755微克和847±1118微克。作者得出結論，在研究的地區呈現中等度維生素A缺乏。

References

1. National Nutrition Policy. Department of Women and child Development, Government of India, Government of India Press, New Delhi, 1993.
2. Vijayraghavan K. National plan of Action. In: Carotene Rich Foods for combating Vitamin A Deficiency. Eds-Reddi V and Vijayraghavan K. National Institute of Nutrition, Government Press, Hyderabad, 1995, pp 49-51.
3. Vijayraghavan K. Vitamin A Deficiency: Consequences and Control Programmes. In: Nutrition in children-developing country concerns. Eds. Sachdev HPS and Chowdhary P, Cambridge Press, New Delhi, 1994, pp-537.
4. National Nutrition Monitoring Bureau. Report on Repeat Surveys (1988-90), National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, 1991.
5. Indicators for assessing vitamin A deficiency and their application in monitoring and evaluating intervention programmes. Report on A joint WHO/UNICEF consultation, 9-11 November, Geneva, 1992.
6. Thimmayamma BVS. A handbook of schedules and guidelines in socio-economic and diet surveys. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad, 1990, pp22-26.
7. Jelliffe DB. Assessment of nutritional status of the community. WHO Monograph No. 53, Geneva, 1966, pp 60-75.
8. Measuring change in Nutritional Status. World Health Organization, Geneva, 1983,pp 6-75.
9. Bhargava SK, Singh KK, Saxena BN. Identification of High Risk Families, Mothers and Outcome of their offspring. Indian Council of Medical Research task force study, ICMR, New Delhi, 1990, pp 66-76.