

# Magnitude of Vitamin A Deficiency in Poor Communities of the four Selected Districts of Punjab using - (Rapid Assessment Technique)

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To determine the prevalence and associated factors responsible for vitamin A deficiency (VAD), a survey was carried out in the 21 selected villages of the 4 selected districts of Punjab, using a rapid assessment technique in July-August 1998. A total of 1526 pre-school going children from 6 months to 6 years were examined for Night Blindness (XN), Bitot's Spots (X1B) and Corneal Scars (XS). Prevalence of VAD came as 6.4% (97 cases), out of which 0.8% (12 cases) were of XN, 5.4% (82 cases) were of X1B and 0.2% (3 cases) were of XS. Male to female ratio was 3:1. Sixty four percent of VAD occurred between ages 4 to 6 years having weights between 15 to 17 kg, which was below the recommended weights. The reason for malnourishment was that majority of VAD cases had diarrhea. Other factors responsible for high prevalence were poor socioeconomic conditions, increased number of children per household, lack of mother's education, low monthly family income, lack of proper breast-feeding, and inadequate usage of vitamin A rich items, like milk and milk products, liver, fish, eggs and mangoes. The reason for not consuming vitamin A rich food was cost of items. The biggest barrier responsible for VAD was poverty. Thus, vitamin A deficiency is a significant major public health problem in the poor communities of Punjab.

**Key words:** Rapid assessment technique, vitamin A deficiency

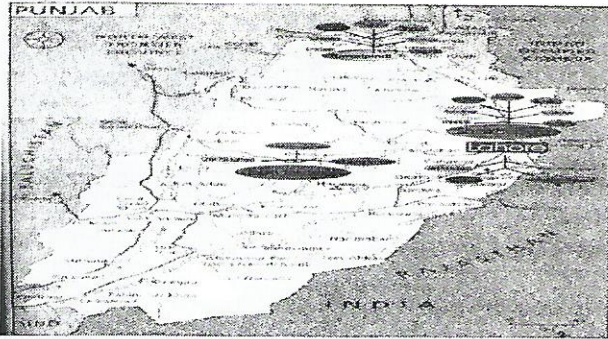
Vitamin A deficiency (VAD) is a major public health problem and affects as many as 256 million children in more than 75 countries and is the world's most prevalent cause of blindness. Some 2.7 million pre-school age children have eye damage from VAD, an estimated 350,000 go blind every year, and 60% die within a few months of becoming blind<sup>1</sup>. Vitamin A deficiency and its ocular manifestations, xerophthalmia, are major causes of blindness and mortality among pre-school children in developing countries<sup>2</sup>. The impact of improved vitamin A status on preschool mortality varies from one population to another and depends on wide variety of factors. These include severity and prevalence of pre-existing related disorders; and the type, intensity, and frequency of prevailing infections and related factors<sup>3</sup>. Over 100 million children suffer from vitamin A deficiency. VAD is also likely to be widespread among women in their reproductive years in many countries. Supplementation of vitamin A is estimated to lower the child's risk of dying by almost 23%<sup>4</sup>. The most recent compilation of the available data revealed that 22% of WHO member states still have a clinically significant problem and 25% of them have a sub-clinical public health problem. For many states the data is still missing or is inadequate. In developing countries, VAD or the resulting eye disease xerophthalmia is the leading preventable cause of severe visual impairment and blindness<sup>5</sup>. Pakistan is predominantly a developing rural country. UNICEF estimates the death rate of children age 1-4 years at 162/1000. Diarrhea and respiratory disease are the leading causes of mortality, together accounting for 60% of deaths. Various surveys carried out in Pakistan have suggested VAD as a possible problem, but there have been no in-depth surveys especially in Punjab and no reliable data is available.

## Materials and methods:

The aim and objectives of the study was to determine the prevalence Vitamin A deficiency i.e. Bitot's spots (XIB), Corneal Scarring (XS) and Night Blindness (XN) in children 6 months to 6 years of age in poor communities of Punjab and to find out the characteristics of children with VAD. Furthermore also to determine the relationship of VAD with the number of children per household, associated diseases, immunization status, monthly family income, item consumed in past 2 months and reasons for not consuming the items in the past 2 months.

The survey was of 8 weeks duration. Children below 6 months of age and above 6 years of age, communities having basic necessities fulfillment, like food, clothing and lodging facilities, communities having satisfactory hygienic conditions, availability of safe and clean water satisfactory sanitary conditions and good nutritive facilities, communities whose monthly income was more than 2000 rupees, communities that were well aware of its public health problems and in whom population rate was low were all excluded. The villages/ poor communities were visited from 8 a.m - 4 p.m., and some times till 7 p.m., depending upon the number of poor children in the village, as poor communities within the villages were scattered and were difficult to locate. The sample size was calculated from the EP16 programme, which was about 1450. In the end of survey 1526 children were examined. About 300-500 children were selected from each district and approximately 700-1000 household were visited. Daily, approximately 30-50 children were examined. A maximum of 13 days was spent in each district. In 47 days survey schedule 10 days were spent near Lahore, 15 days near Sheikhpura, 13 days near Rawalpindi and 9 days near Toba Tek Singh. Team members were one

ophthalmologist and one auxiliary (Assistant). Examination started by noting the study number, date, name, age, gender, weight, address and district of the subject. Eye examination was done with torch and loupe. Criteria for selection for Rapid Assessment were Bitot's spots, Corneal scarring & Night blindness.



Bitot's Spots was a definite, clear and reliable sign and stayed for quite a long time, making community assessment easy. Corneal Scar was also a dependable sign that could be easily measured and which facilitated community assessment. Assessment of Night Blindness when using an interview technique did not present the problem of acceptability. Specific local word for Night Blindness was adopted. In the end of examination, those having vitamin A deficiency were given treatment with vitamin capsules. Such children were given 3 doses, carefully telling them to take vitamin A capsules on the 1<sup>st</sup>, 2<sup>nd</sup> & 14<sup>th</sup> day. Children who required emergency treatment were referred to the nearby hospital. Materials used were torch, 4x examination loupe, proformas, Vitamin A capsules, antibiotic drops and ointments, portable weighing machine and camera. Post-survey methodology included Data entry of the forms in EP16 program, data cleaning, data analysis, data interpretation, results formulation and discussion.

**Results:**

Fig. 1: The below figure shows that out of 1526 children examined 97 had vitamin A deficiency and the prevalence being 6.4%. Out of 6.4%, 5.4% had Bitot's spots (XIB), 0.2% had corneal scars (XS) and 0.8% had night blindness (XN).

- Prevalence of VAD according to XN, XIB & XS

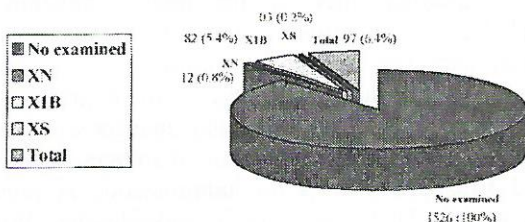


Fig. 2: Male to female ratio regarding XN was 50:50, XIB was 72:28 and XS was 1:2

- Distribution of vitamin A Deficiency by gender

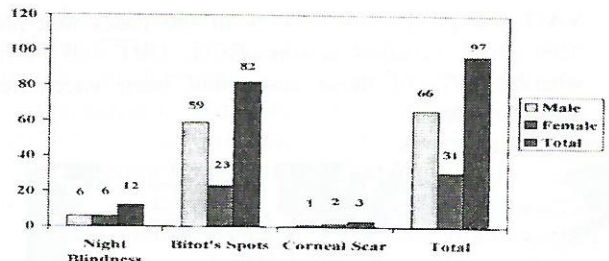
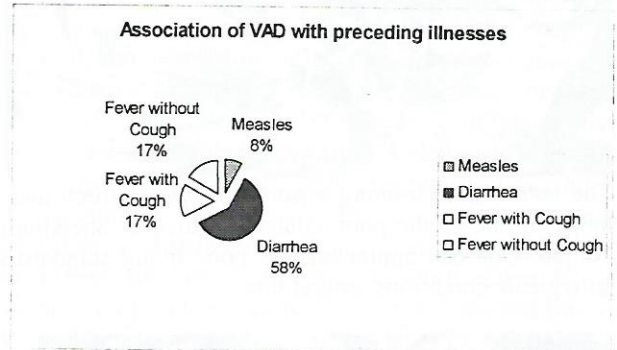


Fig. 3: The figure revealed that 58% of cases had diarrhea, 17% each had fever with and without cough and 8% had measles.



1. Stratified analysis between relationship of age and weight with VAD showed that in all age groups, children having VAD had weight below normal.
2. The poor communities of Lahore had highest prevalence of 8.17% followed by Sheikhpura 6.16%, Toba Tek Singh 6.03% and Rawalpindi of 5.45%
3. Ninety seven percent of Vitamin A deficient cases were those whose monthly family income was Rs 1000 only.
4. 65% of Bitot's spot cases belonged to ages above 4 years, 66% of night blindness cases were above 5 years and 66% of corneal scar cases were those who were less than 4 years of ages.
5. When asked the reasons for not consuming the items rich in VAD all said that those items were too expensive.
6. Thirty nine percent of the children having VAD belonged to those families who had 1 to 3 children, while 61% of the children belonged to those families who had 4 or more siblings per household.
7. 50% of XN and XIB resulted when children were taking vegetables either once a day or at least once a week, whereas CO cases were in those who took vegetables only once a week in the past 2 months. Regarding milk, liver, fish, eggs, mangoes, most did not consume the items in the past 2 months.
8. Ten villages from all districts of Punjab presented with higher prevalence of VAD.
9. Vitamin A deficiency was present in all children whose mothers had no education at all i.e. no schooling.

10. All cases of VAD did not have any previous history of trauma.
11. VAD was present in 80-84% of the cases that had been given vaccines against BCG, DPT and Polio, whereas 69% of these cases had been vaccinated against measles.

#### Survey Photographs



The author is examining a poor kid with a torch and 4X loupe in one of the poor villages in district Sheikhpura, Punjab. One can appreciate the poor living standard and unhygienic conditions around him.



Gul Jan 3 year female, Rajeera Bibi 6 years female and Gul Bakht 1 ½ years male of Dharma Saeedan, district Rawalpindi, were all suffering from night blindness. All were brothers and sisters.



Safia 6 years from Kot M. Hussain, Shahdara, district Lahore had bilateral corneal scars. She developed lesion at the age of 2. She was breast fed for less than 1 year. There

was no history of trauma. Number of siblings per household was 8. Her socio-economic status was poor. Among vitamin A sources she only consumed vegetables during the past 2 months.



Asghari Bibi of Shehzad Park Shahdara, district Lahore aged 4 years was suffering from left corneal scar with bilateral Bitot's spots. The lesion appeared at the age of 2 years. Her mother had no schooling. Her socio-economic status was poor. She was breast fed for less than 1 year with no history of trauma.



Nasir 6, of Chak 707 Kamalia, district Toba Tek Singh had Bitot's spots. He had history of measles. Vegetables were the one, amongst the vitamin A rich sources, which he consumed during the past 2 months.

#### Discussion:

Covering just over 205,000 sq. km, Punjab is the second largest state in Pakistan having a population of over 75 million constituting 56% of the total population of Pakistan.<sup>6</sup> Main occupation is agriculture. There is no shortage of natural resources of Vitamin A which is freely available all round the year in the form of green leafy vegetables, carrots, yellow fruits like mangoes, apricots, melons and apples, and through animal sources like eggs, milk and fish. EPI centers do immunization at regular intervals against DPT, BCG, Polio and Measles. World Health Organization and UNICEF have jointly adopted the goals for control and eventual elimination of VAD and all

its consequences by the year 2000. World Health Organization categorizes Pakistan as a country with severe sub-clinical VAD of public health importance.<sup>7</sup> As there have been no in-depth surveys in Punjab regarding VAD, this study would act as a reference to conduct more detailed epidemiological studies. A survey regarding VAD was done in four districts of Punjab in which 21 villages were selected, and poor communities within the villages were examined based on the poverty criteria. The prevalence of VAD came to be 6.4% having 5.4% Bitot's spots, 0.2% Corneal Scar and 0.8% Night Blindness. Comparisons of these results with other studies are as follows. Prevalence of VAD in children 6 years and younger in Bidar was noted as 2%.<sup>8</sup> Prevalence of VAD in the Ropar district of Punjab, India, in ages between 6 months to 10 years was noted as 7.1%.<sup>9</sup> Prevalence of VAD in 287 children of age groups 6-72 months in Jimma town of Ethiopia showed as 9.1% Bitot's spots. A similar study on 432 children in Agaro town of Ethiopia was done in which prevalence of VAD came to be 4.2%.<sup>16</sup> A Study was conducted in Ethiopia comprising of 6636 children aged 6-72 months, the prevalence of Bitot's spots seen were 1.0% of all children. One case of corneal xerosis and 2 cases of corneal scars were also seen<sup>11</sup>. A Similar study was carried out in Dodata district of Central Ethiopia. A total of 147 children aged 6-72 months were examined. Night Blindness, Bitot's spots & Corneal scar came to be 17.0%, 26.5 & 0.7% respectively.<sup>12</sup> A cross-sectional survey of 18,920 children 6-60 months in Nepal showed Night Blindness 1.37%, Bitot's Spots 3.11%, Corneal scar 0.41%.<sup>13</sup> Results of National Survey of children between 6-71 months in South Africa in 1994 showed 12% of children had Night blindness, while Bitot's spots were seen in 0.4 to 0.8% cases, corneal xerosis in 0.2 to 0.7% cases and corneal scar in 0.1% of children<sup>14</sup>. A national vitamin A survey was done in LAO PDR. 3,376 children aged 0-71 months and 680 of their mothers were examined. Night blindness rate was 0.7 % for children aged 24-71 months; one child had Bitot's spots and one child a corneal scar<sup>15</sup>.

In the present study, the active xerophthalmia (Corneal Scaring) was seen till 4 years of age. This study can be compared to the study in Nepal in which active xerophthalmia (Corneal Scaring) was seen at 5 years of age, while active corneal xerophthalmia was detected at 3 years of age<sup>16</sup>. So the first three years of life are very important as blinding xerophthalmia may occur due to insufficient vitamin A reserves. Mothers should be encouraged to breast feed their children as long as possible.

In the present study, 3 cases of corneal scars were seen. Male to female ratio was 1:2. Out of them two had bilateral corneal scars while one had unilateral scar along with Bitot's spots. Male to female ratio regarding Bitot's spots was more than 2:1, whereas a study in Nepal showed that boys were at significantly higher risk for Bitot's than girls, with boys in Humla running nearly twice the risk for

Bitot's spots as compared to girls<sup>17</sup>. Distribution of VAD by cause revealed that 5.8% of vitamin A deficient cases had diarrhea, while fever with cough (13.4%), fever without cough (14.4%) and Measles (11.3%) contributed almost equal percentages. This can be supported by a study at Chandigarh, India in which diarrhea (7.8%) and respiratory tract infections (14.9%) were also found in cases suffering from vitamin A deficiency<sup>18</sup>. In the present survey it was noted that in all age groups children having VAD had subnormal weights and were malnourished. So there was a direct association of VAD with malnourishment. Malnourished children have a higher mortality and severe complication, as do those living in over crowded accommodation<sup>19</sup>. The frequency of diarrhoeal and respiratory infections are associated with VAD vulnerability. For diarrhoeal disease, restoring vitamin A status decreases the severity of subsequent episodes and risk of death. Vitamin A deficiency tends to reach its apex, following the peak prevalence of diarrhoeal and respiratory diseases<sup>20</sup>. In the present study demographical distribution of four districts revealed that each district had significant public health problem. It was very interesting to see that 60% of VAD cases had four or more children living in on house. Also 98% of the cases belonged to those families who did not possess land for cultivation. Another important aspect was that all the cases belonged to those families who had a monthly income below 1500 rupees (17 U.S. dollars). None of the VAD cases had mothers who were educated i.e. no schooling at all. WHO estimates 1.5 millions blind children in the world, out of which 1 million live in Asia, and in Asia VAD along with other diseases contributes to blindness<sup>21</sup>. A survey of South African children regarding VAD showed that children of mothers without formal education, or with less than 5 years of formal education, were more than twice as likely to have a low vitamin A status than children of mothers with a standard 10 or higher level of education<sup>14</sup>. So it can be said that uneducated and impoverished women tend to follow their own traditional ideas practices. It was also noted in the present study that 77% of VAD cases were either never breast-fed or for less than 12 months. It was also noted that all children having VAD were having green vegetables but not in proper frequency i.e. 50% of the cases took vegetables once a day, and the rest 50% took less than everyday, but at least once a week. Liver, fish, mangoes and eggs were not consumed by any of them, while milk and milk products were consumed by only few. When asked about the cause, all replied "too expensive". One question that should have been asked was the quantity of food consumed. This remains the gray area. But I am sure that as they were living from hand to mouth they could not reach the appropriate standards. With all the rich abundance of vitamin A in the green leafy vegetables, (the main diet in poor communities of Punjab), with all the fruits available, and with all the milk, fish and eggs available, why is

vitamin A deficiency a significant public-health problem in poor communities in Punjab? This is because the impoverished families usually rely on less expensive pro-vitamin A sources to meet their requirements. Pro-vitamin A sources must be converted to retinal before they can provide protection from VAD. Thus, above all, poverty is the main barrier hindering the poor from seeking rich vitamin A items. In the end, I want to recommend that continual government and public efforts for extensive preventive programs in rural areas of Punjab are required; to coordinate different agencies and advocate the importance of mass education, improved sanitation, and personal hygiene and the eradication of superstition and bizarre beliefs, quack and home remedies. The use of pamphlets, exhibitions, lectures, newspaper articles, film shows and media can prove helpful in health education of the public. It is highly important to strengthen primary eye care in view of the existing situation of 6.4% prevalence. In this contest, priority should be given to train LHV's paramedics and general practitioners in primary eye care. Distribution of dried fortified skimmed milk or salt fortified with vitamin A, or systematic distribution of vitamin A to children at risk, or distribution of foods rich in Beta Carotene need be provided to ill-fed population. Knowledge and attitude practices assessment on good nutrition, exclusive breast feeding and good weaning practices need to be incorporated. Improving the diet to include more vitamin A rich foods through the introduction of new crops (gardening), better food population and processing methods and promotion of more varied diets through nutrition education should be promoted. Vitamin A supplements should be distributed to all children below six years of age every six monthly and to plan a comprehensive eye care program for the country to eliminate vitamin A deficiency. For this a systematic, well planned action is required. Comprehensive eye care should comprise of a set of promotive, preventive, curative and rehabilitative actions, not just the curative component.

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