

## Prevalence of Vitamin A Deficiency among Children <6 Years of Age Living in Urban Slums of Lahore

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### ABSTRACT

**Aim:** To investigate ocular manifestation of vitamin A deficiency among children under six years of age living in urban slums of Lahore and to calculate the overall prevalence of VADD as well as that of individual stages of Vitamin A deficiency in these children. My aim was also to draw emphasis on risk factors of VADD and also to find the age and gender distribution of the respondents with the potential risk factors.

**Study design:** Descriptive cross sectional survey.

**Place and duration of study:** Shahdara Town –10<sup>th</sup> August to 30<sup>th</sup> September 2011.

**Methods:** This was a descriptive type cross sectional survey performed in slums of Lahore in four union councils of Shahdara Town; in which 400 children upto six years were examined accordingly.

**Results:** Out of 400 children 57% were male children and 43% were female children. 45% of children were in age group 2-4 years. 31% were in 5-6 years of age group and 24% were below 2 years. In my study 95% of children were having normal – good health. 88% of mothers were having normal- good health. 99% of the study children were having vitamin A rich diet in their routine. 92% of the people were those who were having monthly income >10,000 i.e. who fall in low middle to upper middle class. 42% of mothers knew how to read and write. Out of 400 children, 6% were having blephritis, 3% were having conjunctival injection, 2% were having conjunctival discharge, .3% were found to have measles, 3% of children were with marked diarrhea. Factors which are responsible for high prevalence of vitamin A deficiency like 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.

**Conclusions:** Although short to long term programmes for the prevention and control of vitamin A deficiency are working to some extent, to improve the situation of vitamin A deficiency in these areas more appropriate mix of interventions are needed. More operational research and evaluation are needed to diagnose the problem of vitamin A deficiency. To achieve the goal of virtual elimination of vitamin A deficiency will require the appropriate actions at every level within and across the many sectors of society.

**Keywords:** Vitamin A Deficiency, Children <6 Years of Age, Urban Slums.

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### INTRODUCTION

Vision 2020 (The Right to Sight): The Global Initiative for the Elimination of Avoidable blindness 'Vision 2020' The Right to Sight" is focusing on three major components of target activities. 1-Specific Disease (major causes of blindness) Control, 2-The human resources availability, 3-The appropriate infrastructure and technological development<sup>1</sup>. According to WHO estimates, the most common causes of blindness around the world in 2002 were:

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Cataracts (47.9%), Glaucoma (12.3%), Age-related macular degeneration (8.7%), Corneal opacity (5.1%), Diabetic retinopathy (4.8%), Childhood blindness (3.9%), Trachoma (3.6%) Onchocerciasis (0.8%). In terms of the worldwide prevalence of blindness, it is present on a much greater scale in developing world countries than in developed world countries. According to numbers from the WHO, 90% of blind people live in the developing world. Of these, cataract is responsible for 65% or more than 22 million cases of blindness and glaucoma is responsible for 6 million cases, while leprosy and onchocerciasis each blind approximately one (1) million individuals worldwide. The number of individuals blind from trachoma has dropped dramatically in the past 10 years from 6 million to 1.3 million, putting it in seventh place on the list of causes of blindness worldwide. Xerophthalmia is estimated to affect 5 million children each year;

500,000 develop active corneal involvement, and half of these go blind. Central corneal ulceration is also a significant cause of monocular blindness worldwide, accounting for an estimated 850,000 cases of corneal blindness every year in the Indian subcontinent alone. As a result, corneal scarring from all causes now is the fourth greatest cause of global blindness<sup>2</sup>.

Vitamin A Deficiency: It is a major public health problem worldwide. It is one of the most important preventable causes of blindness. A deficiency occurs due to an overall inadequate intake of vitamin A and sometimes due to the loss of vitamin A through chronic diarrhea. Low blood retinol concentrations indicate that levels of vitamin A are low in the body. Iron deficiency can also affect vitamin A metabolism, and iron supplements provided to iron deficient individuals may improve body stores of iron as well as vitamin A<sup>3</sup>. Approximately 127 million preschool aged children and 7 million pregnant women are vitamin A deficient<sup>4</sup>. Xerophthalmia is a term covering a range of ocular manifestations of vitamin A deficiency. This condition often occurs in preschool children affected by malnutrition. Clinical manifestations of the condition have been summarized in the 1974 five-grades WHO classification<sup>5</sup>. At least 5-12 million children develop xerophthalmia every year of whom between quarter and half a million go blind<sup>6</sup>. The relationship between xerophthalmia and measles is complex. Vitamin A deficiency promotes measles which in turn fastens the perforation of cornea, particularly in malnourished children. Vitamin A has a beneficial effect on both xerophthalmia and measles<sup>7</sup>. According to United Nations one billion people worldwide live in slums<sup>8</sup>. Xerophthalmia was at a plane of public health importance in children living in slums in Pune. The study highlights the value of female education and indicates that vitamin A supplementation and other approaches to control need to be improved in children living in underprivileged areas like urban slums<sup>9</sup>. Increased vitamin A supplementation, health and nutrition education and consumption of vitamin A rich foods are essential to prevent Vitamin A Deficiency<sup>10</sup>. Vitamin A Deficiency appears to be a reasonable public health problem in certain areas of China. In areas with low socioeconomic status, Vitamin A Deficiency in children is more severe, and infants may be at the maximum risk for Vitamin A Deficiency. Insufficient intake of Vitamin A rich foods may result in Vitamin A Deficiency. A wide-ranging long term national strategy needs to be fostered in China for the treatment and prevention of the deficiency<sup>11</sup>. Although short- to long-term prevention and control programmes are to some degree in place, to get better the situation of vitamin A deficiency, Bangladesh needs a more suitable mix of

interventions for the whole population. More operational research and evaluation are needed if a fully effective programmes to lessen the problem of vitamin A deficiency to be developed. Finally, to achieve the goal of effective elimination of vitamin A deficiency will require an incorporated approach which brings together appropriate actions at every level, within and across the many sectors of society<sup>12</sup>. The data suggests that vitamin A deficiency is still a serious public health problem in rural areas of the Congo in which this study was carried out<sup>13</sup>.

Another research conducted to assess Vitamin A status of preschool children indicated that Vitamin A deficiency, reflecting poor nutrition and health, is a serious public health issue among children aged less than six years in Congo<sup>14</sup>. Research indicates that an overall strategy designed to prevent and control vitamin A deficiency, xerophthalmia, and nutritional blindness can be defined in terms of action taken in the short, medium, and long term. A short term, emergency measure includes the administration to vulnerable groups of single large doses of vitamin A on periodic bases. In the medium-term, fortification of dietary vehicle (e.g. sugar or monosodium glutamate) with vitamin A can be initiated. Increased dietary intake of vitamin A through home gardening and nutrition education programmes comprises the long term solution to this problem<sup>15</sup>. Night blindness was found in 0.5% of the children, Bitot's spots in 1.7%, corneal ulceration in 0.04% and corneal scars in 0.04% thus Xerophthalmia and vitamin A deficiency are public health problems in western Yemen<sup>16</sup>. Clinical Vitamin A deficiency was most prevalent among children who had not received vitamin A during the most recent vitamin A capsule distribution. Indeed, the data show that vitamin capsule receipt among children conferred a 59% protective effect for night-blindness and a 51% effect for Bitot's spots. These results point to significant progress having been achieved by the National Vitamin A Programme and National Immunization Day capsule activities<sup>17</sup>. This public health problem has become more significant because children are apparently healthy and if timely vitamin A supplementation is not given, any intercurrent infection is likely to worsen the vitamin A status, increasing the widely known consequences<sup>18</sup>. These data define vitamin A deficiency as a severe public health problem in the Bandiagara area of Mali<sup>19</sup>. Vitamin A Deficiency is a nutritional problem in China, especially in the remote and poverty-stricken rural areas of China and Vitamin A Children living in poor western area, having a mother with minority ethnicity or a mother with poor education have high risk of Vitamin A Deficiency<sup>20</sup>.

In general, status of Vitamin A Deficiency in children of Tibet was milder than that at national

level. But, moderate sub clinical vitamin A deficiency in some areas, such as farming and semi-farming countries, did exist, so vitamin A supplementation aiming to children, especially those under one year of age, in those areas should be urged<sup>21</sup>. The prevalence of malnutrition was high among the Karen hill children aged 1-6 years, Thailand most of the children suffered from upper respiratory tract infection, skin infection, scabies and/or diarrhea. Nearly all of them had scaly and dry skin over their chest walls and legs which indicated essential fatty acid deficiencies<sup>22</sup>. The individuals with elevated acute phase proteins when excluded, it does not improve vitamin A deficiency prevalence estimates and instead it leads to sampling bias for variables, like age, gender, anemia and hospitalization history<sup>23</sup>. Nutrition problem like protein energy malnutrition, vitamin A deficiency and anemia continue to plague a large proportion of Indian children. The nutritional status of children living in slums is worst among all urban groups and even poor than the rural average. Most common causes of malnutrition include impaired utilization of nutrients due to infection and parasites, faulty infant feeding practices, inadequate food and health security, poor environmental conditions and lack of proper child care practices. High prevalence of malnutrition among young children is also due to lack of awareness and knowledge regarding their food requirements and absence of a responsible adult care giver. With increasing urban migration in coming years, the malnutrition problems in urban slums will also acquire increasing dimensions unless special efforts are initiated to mitigate the health and nutrition problem of urban poor. Improving nutrition status of urban poor requires a more diet, more focus and more integrated strategy<sup>24</sup>.

The proportion of children at risk for retinol deficiency was significantly higher in rural areas as compare to urban areas of Costa Rica (38.9% and 28.0% respectively,  $p < 0.05$ ). It was also found that plasma retinol levels were negatively related to number of family members and positively related to mothers schooling. Our results suggest the possible impairment in vitamin A status of preschool children<sup>25</sup>. Like all developing countries clinical cases of vitamin A deficiency in children occur in Pakistan too. Children under 6 years of age are most vulnerable age group and there is seasonal variation in presentation, both life and sight of these children at risk. Community based studies may be helpful to identified the magnitude of the problem and possible risk factors at national, provincial, and districts levels<sup>26</sup>. Vitamin A deficiency, including mild xerophthalmia appears to effect large numbers of school aged children in South-East Asia. The

estimated prevalence of vitamin A deficiency is 23.4% suggesting that there are 83 million vitamin A deficient school-aged children, of whom 10.9% (9 million, at an overall prevalence of 2.6%) have mild xerophthalmia (night blindness or Bitots spots). High risk blinding xerophthalmia appears to be negligible at this age<sup>27</sup>. Malaria and vitamin A deficiency, both are highly prevalent health problems in Africa. It was found that most of the children, who are affected by malaria, also have vitamin A deficiency. A low serum retinol concentration (a marker of vitamin A deficiency) is commonly found in malaria affected children. Although vitamin A supplementation reduces the incidence of uncomplicated malaria by about one-third, it does not appear to reduce the rate of death that can be specifically attributed to malaria. Programs that deliver separate intervention against both problems<sup>28</sup>.

Risk factors in Ethiopian children found were lack of vitamin A supplement over the year, illness 2 weeks preceding the survey, incomplete or not at all vaccination and low levels of awareness of vitamin A, Muslim children were found more deficient in vitamin A, most likely be due to more maternal parity. After these findings, the author suggested the need for awareness of family planning, importance of vitamin A, promotion of vaccination and child health and vitamin A supplementation<sup>29</sup>.

Vitamin A deficiency is often considered as a significant public health problem on developing countries. It is among the preventable causes of blindness. It is the major cause of blindness in children. Poor socioeconomic conditions favor the prevalence of vitamin A deficiency. In most of the effected countries it is common in rural areas but also prevalent in urban slums. Currently the condition of backward areas of our cities particularly slums are poor and thus favor vitamin A deficiency. The purpose of this study is to determine the number of vitamin A deficient children aged up to 6 years and, therefore, to estimate whether vitamin A deficiency present in urban slums or not in order to take essential steps to manage this public health problem.

## MATERIALS AND METHODS

This was a descriptive cross sectional survey performed in slums of Lahore in four union councils of Shahdara town; (an urban slam of Lahore city) from 10<sup>th</sup> August to 30<sup>th</sup> September 2011. A total of 400 children upto six years were examined accordingly (instruments/ equipment used: snellens visual acuity chart, pin hole opaque occluder, pen torch, ophthalmoscope heine, weigh machine & binomag-loop). In which non probability convenient sampling was used as sampling method & sample

selection criterion was followed as inclusion criteria: Children up to 6 years of age living in slums of Lahore for the last six months & exclusion criteria: Children having corneal opacities due to other causes like trauma, inflammation, congenital and hereditary factors. Data was collected through self-designed Performa & analysed by using SPSS Version 13.00 software.

## RESULTS

In this study out of 400 children; 57% were male children and 43% were female children. 45% of children were in age group 2-4 years. 31% were in 5-6 years of age group and 24% were below 2 years. In my study 95% of children were having normal – good health. 88% of mothers were having normal- good health. 99% of the study children were having vitamin A rich diet in their routine. 92% of the people were those who were having monthly income >10,000 i.e. who fall in low middle to upper middle class. 42% of mothers knew how to read and write. Out of 400 children, 6% were having blephritis, 3% were having conjunctival injection, 2% were having conjunctival discharge, .3% were found to have measles, 3% of children were with marked diarrhea. Factors which are responsible for high prevalence of vitamin A deficiency like 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. In this study I did not found any case clinically related to vitamin A deficiency.

## DISCUSSION

In current study of "prevalence of vitamin A deficiency among pre-school children living in urban slums of Lahore", we did not found any case clinically related to vitamin A deficiency among study population. Boys were 57% of the total sample and girls were 43% of the total sample. Sex ratio of male to female in Pakistan is at birth: 1.05 male /female under 15 years<sup>30</sup>. In our study it was 1.32. Majority of the children in our study were between ages 2 to 4 years (45%). 31% children were between ages 4 to 6 years and 24% were below 2 years. In this study 95% of children were having normal to good health, 88% of mothers were having normal to good health. So majority of children and mothers were healthy. In this study sample very less percentage of children and mothers were in poor health. The reason may be that there was 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, and mothers were having the awareness of importance of these foods for children as well as for themselves. People in this community were having satisfactory income to fulfill the basic requirements of their life. 92% of the people were those who were having monthly income >10,000 i.e. who fall in low middle to upper middle class. Very less percentage of people was living in hand to mouth situation. EPI centers do immunization at regular intervals against DPT, BCG, Polio and Measles, survey teams for vitamin A drops and capsules do regular visits of such places. 42% of mothers knew how to read and write. Mothers were very well aware of the importance of breast feeding. Most of the children were breast fed for up to 2 years which also decreases the risk of vitamin A deficiency and risk of other diseases also. 99% of the study children were having vitamin A rich diet in their routine. Out of 400 children, 6% were having signs of blephritis, .3% were having conjunctival injection, 2% were having conjunctival discharge, .3% was found to have measles, and 3% of children were with marked diarrhea.

A research conducted by department of pathology of Agha Khan University Karachi showed that no xerophthalmia was detected in children living in urban slums of Karachi. In this study the population size was 532 children with age range of 6-60 months. During this survey three methodologies were used: clinical eye examination, dietary vitamin A intake and serum retinol level. Though xerophthalmia was not prevalent but based on serum retinol level and dietary history it was concluded that significant number of children in these communities have low vitamin A levels and thus may constitute a risk group<sup>31</sup>.

Although short- to long-term prevention and control programmes are to some extent in place, to improve the situation of vitamin A deficiency, Bangladesh needs a more appropriate mix of interventions for the entire population. More operational research and evaluation are needed if a fully effective programme to alleviate the problem of vitamin A deficiency to be developed. Finally, to achieve the goal of virtual elimination of vitamin A deficiency will require an integrated approach which brings together appropriate actions at every level, within and across the many sectors of society<sup>28</sup>.

Research indicates that an overall strategy designed to prevent and control vitamin A deficiency, xerophthalmia, and nutritional blindness can be defined in terms of action taken in the short, medium, and long term. A short term, emergency measure includes the administration to vulnerable groups of single large doses of vitamin A on periodic bases. In the medium-term, fortification of dietary vehicle

(e.g. sugar or monosodium glutamate) with vitamin A can be initiated. Increased dietary intake of vitamin A through home gardening and nutrition education programmes comprises the long term solution to this problem<sup>31</sup>.

Vitamin A deficiency is a nutritional problem in China, especially in the remote and poverty-stricken rural areas of China and Vitamin A Children living in poor western area, having a mother with minority ethnicity or a mother with poor education have high risk of Vitamin A Deficiency<sup>27</sup>.

## RECOMMENDATIONS

1. Similar studies on the large scale should be conducted within diverse population for wider probing of situation in the country.
2. Screening on large scale should involve biochemical determinants such as serum retinol level in the blood.
3. Programmes to control vitamin A level should be developed.
4. Develop awareness among people that they should take balanced diet. Fish fruits and green leafy vegetables should be taken in daily diet.
5. Mothers and other care -givers need to be convinced of the need to provide diets rich in vitamin A.
6. Xerophthalmia must be considered as a medical emergency as it carries a high risk of corneal destruction, blindness and even death.
7. Any underlying systemic illness must be restored and treated.
8. All cases of measles in a population where measles case-fatality rate exceed 1% should be presumed as vitamin A deficient.
9. All children with measles under 2 years of age should be considered for vitamin A therapy.
10. Effective measles immunization eliminates one of commonest factor responsible of blinding Xerophthalmia and vitamin A-related childhood mortality.
11. Children suffering severe protein-energy malnutrition should also be considered at high risk of developing clinically significant deficiency.
12. Environmental sanitation and better housing reduce the prevalence of respiratory tract infections, tuberculosis, diarrhea, and worm infestation and thus increase absorption of, and decrease metabolic need for vitamin A.
13. Oral administration of vitamin A is preferred because it is safe, cheap and highly effective: 110 mg retinyl palmitate or 66 mg retinyl acetate.
14. In presence of corneal involvement, broad spectrum antibiotics should be applied.

15. An understanding of dietary and socioeconomic determinants of vitamin A deficiency is necessary in order to design appropriate intervention programmes for each community.
16. Three main interventions i.e. Dietary intake of food rich in vitamin A, Periodic administration of large doses of vitamin A & Fortification
17. Establish comprehensive eye-care services so that children with a complaint of night blindness may be attended early before they may develop significant Xerophthalmia.
18. Nutrition education is also a feasible intervention and has a potential to achieve millennium goals.
19. Furthermore extensive surveys and studies to be needed to find out the status of VADD in Lahore as well as all over Pakistan.

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