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Prevalence of Malnourished Students and their Visual Abnormalities in Rural Tripura

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Abstract

Aim: Prevalence of ocular manifestations in malnourished students attending in different seiner basic schools of rural Tripura.

Material & Method: A cross-sectional study was carried out in different rural seiner basic schools of Tripura, with the of age group 10 - 14 years. All students underwent detailed systemic and ocular examination. The results were analysed statistically.

Results: In our study the prevalence of malnourished students were 247(28.10%). Girls' students were more sufferer than boys. Out of 247 malnourished students, where 44 (17.81%) boys and 49 (19.84%) girls had night blind ness; 08 (3.24%) boys and 13 (5.26%) girls had Bitot's spot; 22 (8.91%) boys and 30 (12.15%) girls had blepharitis; 5(2.02%) boys and 6(2.43%) girls had corneal ulcer; 15(6.07%) boys and 20(8.10%) girls had Allergic Conjunctivitis; 15(6.07%) boys and 22(8.91%) girls had Phlyctenular Conjunctivitis in different age groups. There is significant difference of ocular involvement between malnourished and well nourished.

Conclusion: Overall prevalence of malnourished students was found different rural schools in our study. This may be probably due to the negligence of vaccination in their childhood life and the proper nutritional supplements were not being provided to them from different appropriate sources through various national programmes.

Keywords: malnutrition; night blindness; conjunctival xerosis; Bitot's spots; corneal ulcer; Phlyctenular conjunctivitis; Tripura

Introduction

Malnourished children are frequently suffering visual abnormalities. The effects of malnutrition on eye are frequently more serious during their growing period. These are an important cause of preventable blindness and is to be taken care of through cost effective means. Prevention of vitamin A deficiency related disorders like xerophthalmia is of utmost value in preventing childhood or young children blindness.

Malnutrition among students in rural Tripura can lead to various ocular effects, with Vitamin A deficiency being a primary cause. This deficiency can cause xerophthalmia, including night blindness, conjunctival and corneal xerosis, and in severe cases it also found as keratomalacia. In addition, malnutri-

tion can increase the risk of other ocular morbidities like conjunctivitis and refractive errors.

It has been a nutritional problem of public health significance in India and continues to be so even though the National Vitamin A Prophylaxis Programme has been in operation for more than three decades [1].

Vitamin A is crucial substances for maintaining healthy vision, particularly in low-light conditions. Insufficient vitamin A can led to night blindness, where individuals struggle to see in dim light or at night.

Vitamin A deficiency (VAD) has been recognized as a major preventable public health and nutritional problem in India. An estimated 5.39% children in India suffer from eye signs of VAD. The prevalence was higher than WHO cut off level of 0.5%, indicating the public health significance of the problem of VAD [1].

VAD is identified as the most common single cause of childhood blindness with measles as an important precipitating factor [2]. Vitamin A is a crucial supplement for maintaining healthy vision, particularly in low-light conditions. Insufficient vitamin A can led to night blindness, where individuals struggle to see in dim light even at night also.

Xerophthalmia includes: Conjunctival xerosis: (dryness and thickening of the conjunctiva); Corneal xerosis: (dryness and clouding of the cornea); Bitot's Spot: (abnormal, raised, foamy patches on the conjunctiva); Keratomalacia: (a severe condition where the cornea softens and can lead to ulceration).

The formulation of an effective intervention health programme begins with the knowledge of the magnitude of the problem in the community. Although costly and time consuming the actual assessment of a health problem is far less expensive than the intervention itself and may suggest where and how prevention activities can best be implemented.

The purpose of this study is to know the nature, magnitude and severity of ocular manifestations in malnourished school going children and to assess the present situation of prevalence in the rural area, in view of improving parameters of nutrition, by increasing awareness, education and information of vaccination and nutrition, by different health workers. Ocular manifestations in children are very important because, while some conditions such as refractive errors and cataract are treatable others like measles and vitamin A deficiency are preventable.

Many ocular diseases have their origin in childhood and the morbidity may go unnoticed and cause severe ocular disability in the later part of life. Effective methods of vision screening and ocular manifestations in toddlers and young children are useful in detecting correctable causes of decreased vision and in minimizing long term visual disability. Considering the fact that 30% of India's blind lose their sight before age of 20 years, the importance of early detection and treatment of ocular morbidity and visual impairment in young children is obvious [3].

India is a developing country, hence prone more to malnutrition, such as vitamin A deficiency. Our Indian Government is stressing more and more on malnourishment and so many programs and strategies are made and being implemented over the grass root level.

By looking at these facts, the present study is undertaken to find out the prevalence of ocular manifestations associated with nutritional deficiencies in the relatively more vulnerable group of children with the hope, that it would provide useful information regarding magnitude of the problem and would also lead to a better understanding of related factors, enabling us to tackle it more effectively.

Malnutrition-related eye problems can significantly impact a student's ability to learn and participate in school activities, potentially hindering their academic performance and overall development.

Aim of the study

To assess the prevalence of childhood blindness and ocular manifestations among the malnourished students of rural Tripura.

Material and Method

This study was carried out by two sections by professional Optometrists and of Tripura, from September 2024 to January 2025. In the study, eye camps were conducted in different seiner basic schools of rural Tripura, where identified malnourished students in both genders in the age groups of 10 to 14 years by the professional Optometrists, subsequently visual system examination were done to find out any abnormalities by Optometrists among the malnourished students. In this study, we were identified 247 malnourished school students from 27no's seiner basic schools of rural Tripura.

Inclusion criteria

All students of 10-to-14-year age group and had have malnourished were attending in different rural schools of Tripura to find their ocular abnormalities.

Exclusion criteria

Students more than 14 years and less than 10 years in age and students who were not facing any malnutrition related disorders. Students with history of ocular trauma or any other pre-existing ocular disease were not included in this study.

The study was conducted in two sections. First part was to identifying the malnourished students in different seiner basic schools of rural Tripura among the age group of 10 to 14 years students. To find out the malnourished students, professionals were collected students name, age, sex and address and were assigned a serial number. A detailed history was elicited from the parents or from the students himself wherever possible and was written down on a predesigned format. The history of present illness was enquired in detail including the mode of onset of symptoms with duration. A detailed history of diet and dietary habits of each student was noted. Detailed family history including occupation of parents, per capita income of the family, educational status of parents, number of siblings. Height, weight of the students was measured by stadiometer and weighing scale respectively. In this study, we have used the Indian Academy of Paediatrics (IAP) recommended height & weight chart [4]. Below these range of height & weight treated as malnourished.

Years	Boys		Girls	
	Height(cm)	Weight(kg)	Height(cm)	Weight(kg)
10 – 11 Years	124-145	31.4-32.2	132-142	32.5-33.7
11 – 12 Years	130-150	32.2-37.0	132-142	33.7-38.7
12 – 13 Years	135-155	37.0-40.9	133-149	38.7-44.0
13 – 14 Years	140-160	40.9-47.0	133-159	44.0-48.0

IAP recommended height & weight chart

To check vitamin-A levels, will likely order a serum retinol blood test, which measures the amount of retinol, means the active form of vitamin-A in the student's blood. Fasting blood is drawn from a vein from their arm, and the sample is sent to laboratory analysis.

The test is used to diagnose vitamin-A deficiency or toxicity. A normal blood level for vitamin-A is typically between 20 and 60 micrograms per decilitre (mcg/dL). Less than this range it is called vitamin-A deficiency.

In the study, second part was conducted by Optometrists. Detailed Ocular examinations were conducted using torch light and binocular loupe to the identified malnourished students screened from different seiner basic schools of rural Tripura among the age group of 10 to 14 years students. Visual acuity measurement was done by Snellen's chart, direct ophthalmoscopy was done for fundus examinations. Visual acuity was corrected by streak retinoscopy as objective method followed by different subjective methods, which one was accepted by specific students. Colour vision was examined by Ichihara Chart. In the study, it was found that identified malnourished students were suffered Night blindness, Conjunctival xerosis, Bitot's spots, Corneal xerosis, Corneal ulcer, Corneal scar, Xerophthalmic fundus, Blepharitis, Allergic Conjunctivitis, Phlyctenular conjunctivitis, Trachoma etc.

The data was analysed statistically. Verbal consent for the study was given by the local body of different seiner basic schools of rural Tripura prior to commencement of study.

Result of the study

In the study total 879 students were screened in 27 seiner basic school of rural Tripura. Among the screened students 247(28.10%) were getting malnourished students. In time of study, also screened their socio-economic status as well as height and weight measurement of their body. According to serum retinol test by laboratory they were detected vitamin-A label in their blood. Out of 247 malnourished students 138 were girl students and 109 were boys [Table – 1].

Malnourished	Students	Percentages
Boys	109	44.13%
Girls	138	55.87%
Total	247	100.00%

Table – 1: Gender wise malnourished students

Out of 247 Malnourished students 109 were boys, where 10 years students were 21, 11 years students were 23, 12 years students were 19, 13 years students were 22, 14 years students were 24 [Table – 2].

Students Age	Malnourished students	Percentages
10 years	21	8.50%
11 years	23	9.31%
12 years	19	7.69%
13 years	22	8.91%
14 years	24	9.72%
Total	109	44.13%

Table – 2: Malnourished boys in different age groups

Out of 247 Malnourished students 138 were girls, where 10 years students were 27, 11 years students were 31, 12 years students were 25, 13 years students were 29, 14 years students were 26 [Table – 3]

Students Age	Malnourished students	Percentages
10 years	27	10.93%
11 years	31	12.55%
12 years	25	10.12%
13 years	29	11.74%
14 years	26	10.53%
Total	138	55.87%

Table – 3: Malnourished girls in different age groups

Out of 247 malnourished students, serum retinol blood test was done for all the malnourished students for analysing their retinol level, deuteration of serum retinol level all are facing vitamin-A deficiency disorders in the visual system [Table – 4].

Students Age	Boys			Girls		
	< 10mcg/dL	< 15mcg/dL	< 20mcg/dL	< 10mcg/dL	< 15mcg/dL	< 20mcg/dL
10 years	5 (2.02%)	7 (2.83%)	9 (3.64%)	7 (2.83%)	9 (3.64%)	11 (4.45%)
11 years	6 (2.43%)	9 (3.64%)	8 (3.24%)	9 (3.64%)	11 (4.45%)	11 (4.45%)
12 years	4 (1.62%)	7 (2.83%)	8 (3.24%)	7 (2.83%)	9 (3.64%)	9 (3.64%)
13 years	7 (2.83%)	8 (3.24%)	7 (2.83%)	8 (3.24%)	9 (3.64%)	12 (4.86%)
14 years	6 (2.43%)	9 (3.64%)	9 (3.64%)	6 (2.43%)	10 (4.05%)	10 (4.05%)
Total	28 (11.34%)	40 (16.19%)	41 (16.60%)	37 (14.98%)	48 (19.43%)	53 (21.46%)

Table – 4 Gender wise serum retinol level in different age groups

In the second phase of the study was continued by Optometrists. Out of 247 malnourished students among both genders, it was observed that some students were facing night blindness, few students were found Bitot's spot, few students were found Corneal ulcer, Blepharitis, Allergic Conjunctivitis, Phlyctenular conjunctivitis etc. Out of 247 malnourished students, 44 (17.81%) boys had night blind ness; 08 (3.24%) boys had Bitot's spot; 22 (8.91%) boys had blepharitis; 5(2.02%) boys had corneal ulcer; 15(6.07%) boys had Allergic Conjunctivitis; 15(6.07%) boys had Phlyctenular Conjunctivitis in different age groups [Table – 5].

Vitamin-A Deficiency Diseases	Boys				
	10 Yrs	**11 Yrs**	**12 Yrs**	**13 Yrs**	**14 Yrs**
Night Blindness	11(4.45%)	9(3.64%)	9(3.64%)	7(2.83%)	8(3.24%)
Bitot's Spot	4(1.62%)	2(0.81%)	1(0.40%)	1(0.40%)	0
Blepharitis	8(3.24%)	5(2.02%)	3(1.21%)	4(1.62%)	2(0.81%)

Corneal Ulcer	1(0.40%)	2(0.81%)	1(0.40%)	0	1(0.40%)
Allergic Conjunctivitis	7(2.83%)	4(1.62%)	2(0.81%)	2(0.81%)	0
Phlyctenular Conjunctivitis	4(1.62%)	2(0.81%)	4(1.62%)	3(1.21%)	2(0.81%)
Total	35(14.17%)	24(9.72%)	20(8.10%)	17(6.88%)	13(5.26%)

Table – 5: Vitamin-A deficiency related disorders in different ages of boys

Out of 247 malnourished students, 49 (19.84%) girls had night blind ness; 13 (5.26%) girls had Bitot's spot; 30 (12.15%) girls had blepharitis; 6(2.43%) girls had corneal ulcer; 20(8.10%) girls had Allergic Conjunctivitis; 22(8.91%) girls had Phlyctenular Conjunctivitis in different age groups [Table – 6].

Vitamin-A Deficiency Diseases	**Girls**				
	10 Yrs	**11 Yrs**	**12 Yrs**	**13 Yrs**	**14 Yrs**
Night Blindness	14(5.67%)	11(4.45%)	9(3.64%)	6(2.43%)	9(3.64%)
Bitot's Spot	6(2.43%)	2(0.81%)	1(0.40%)	2(0.81%)	2(0.81%)
Blepharitis	11(4.45%)	7(2.83%)	4(1.62%)	5(2.02%)	3(1.21%)
Corneal Ulcer	2(0.81%)	1(0.40%)	0	2(0.81%)	1(0.40%)
Allergic Conjunctivitis	7(2.83%)	3(1.21%)	4(1.62%)	3(1.21%)	3(1.21%)
Phlyctenular Conjunctivitis	6(2.43%)	4(1.62%)	5(2.02%)	2(0.81%)	3(1.21%)
Total	46(18.62%)	28(11.34%)	23(9.31%)	20(8.10%)	21(8.50%)

Table – 6: Vitamin-A deficiency related disorders in different ages of girls

Discussion

In the current study total 879 students were screened in 27 seiner basic school of rural Tripura. Among the screened students 247(28.10%) were getting malnourished students.

Prevalence of ocular involvement in our observation, 247 students have had malnourished, where 44 (17.81%) boys and 49 (19.84%) girls had night blind ness; 08 (3.24%) boys and 13 (5.26%) girls had Bitot's spot; 22 (8.91%) boys and 30 (12.15%) girls had blepharitis; 5(2.02%) boys and 6(2.43%) girls had corneal ulcer; 15(6.07%) boys and 20(8.10%) girls had Allergic Conjunctivitis; 15(6.07%) boys and 22(8.91%) girls had Phlyctenular Conjunctivitis in different age groups.

In our study girls were more sufferer than boys. Because of girls are more neglected, ignorance, proper diets are not taken.

Dole K et al (2009) worked on prevalence and determinants of xerophthalmia in preschool children in urban slums in Pune and found xeropthalmia in1.32% cases [5].

Gupta Y et al (2011) done a similar study in rural population in UP, India, and found prevalence of Bitot's spots0.90% [6].

Arlappa N et al (2011) have done a study on Prevalence of vitamin A deficiency and its determinants among rural preschool children of MP, India with results that prevalence of night blindness and Bitot's spots was 0.8% & 1.4%respectively and prevalence increased significantly with age and more in low socioeconomic and illiterate mother [1].

Laxmaiah A et al (2012) in their study of rural pre-school children found 0.8 % prevalence of Bitot's spot [7]. Duke university eye centre study found the Prevalence of xerophthalmia (20.8%) among malnourished children in rural Ethiopia [8].

The high prevalence may be due to the fact that it is a very under developed African country. In another study, Vitamin A deficiency was found in.278 children (5.39%). The highest prevalence occurred in the age group of 4 to 6 years and in families with income less than Rs.500/= per month (10.2%) and in Muslims (8.7%) [3].

Laxmaiah A et al found total ocular signs were significantly higher among boys (2-6%) compared with girls (1-9%) [7].

Duke university eye centre study observed that severely malnourished were more likely to suffer from xerophthalmia than moderately and mild malnourished. Xerophthalmia is common global cause of paediatric blindness and is highly correlated with severe malnutrition [8]

In a similar type of study done in Nepal in 1998, they also found a drastic reduction in incidence of Bitot's spot and night blindness among school children in last 21 years because of the national programmes like national vitamin A programme (NVAD) [9].

Conclusion

The present study was aimed at evaluating the prevalence of ocular manifestations in malnourished students attending in rural seiner basic school of Tripura. Students in the age group 10 to 14 years form an important target group which must be screened adequately for early detection of eye diseases and prevention of Vitamin-A deficiency diseases. Also, every student those who were suffering vitamin-A deficiency should be immunized and given prophylaxis for vitamin A. The recommended daily allowance (RDA) of vitamin A for 10- to 13-year-old, is 600 mcg Retinol Activity Equivalents (RAE) among males and females, while for a 14- to 18-year-old, it is 900 mcg RAE for males and 700 mcg RAE for females. Our study revealed that Vitamin-A deficiency is a major nutritional problem and coverage of vitamin A supplementation needs improvement. The important factors for Vitamin-A deficiency were found to be low socioeconomic status, illiterate parents and poor sanitation. Vitamin A supplementation programme should be strengthened through governments authorities and this will go a long way in preventing childhood blindness and morbidity. It is also equally important to educate mothers about sanitation, nutrition and immunization.

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