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Original Research Article

Prevalence of vitamin A deficiency in school children aged 6-16 years in Taoru Tehsil of South Haryana

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ABSTRACT

Background: Sufficient data on occurrence of ocular morbidities associated with vitamin A deficiency (VAD) amongst school children was not available. Hence this study was aimed to evaluate the prevalence of clinical forms of vitamin A deficit among the primary school children in relation to socio-economical status and BMI associated risks related to VAD.
Methods: A randomized sampling study was designed among school children of 6-16 years of age after taking consent form from principal and teachers of different schools in Taoru Tehsil of South Haryana. A predesigned performa was used to collect the information.
Results: Total 300 school children were examined for VAD, out of which 157 (52.3%) were boys and 143 (47.7%) were girls. Among the school children 53 (13.7%) students were under the age group of 6-11 years and 247 (86.3%) students were 12-16 years. Prevalence of VAD was observed in17 (5.7%) students, among them1 (0.3%) was associated with night blindness, 1(0.3%) conjunctival xerosis and 14 (5%) with bitots spot. Among 17 VAD suspects 13 (76.5%) were girls and 4 (23.5%) were boys. According to modified Kuppuswamy scale of Socio-economic status 48 (16%) students belongs to class III, 229 (76.33%) students from class IV and 23 (7.66%) students from class V. Out of 17 VAD suspects 2 (11.76%) belongs to class III, 14 (82.35%) belongs to class IV and 1 (5.88%) belongs to class V. Out of 17 VAD suspects all 17 (100%) were underweight.
Conclusions: Socio-economic status and BMI index were closely associated with VAD. Prevention, early recognition, prompt treatment of ocular diseases by regular screening of students and nutritional education in schools would definitely decreases the risk of ocular abnormalities.

Keywords: Vitamin A deficiency, Socio-economic status, BMI

INTRODUCTION

Vitamin A deficiency (VAD) disorders comprises the full spectrum of clinical consequences related to suboptimal vitamin A level.[1] These disorders reduces immune competence resulting in increased morbidity and mortality night blindness, corneal ulcers, keratomalacia and related ocular signs and symptoms of xerophthalmia.[1-7] Nutritional stresses of pregnancy and lactation appear to increase the risk of VAD disorders among reproductively active women, reflected by typical incidence rates of 10% for maternal night blindness in malnourished populations.[8] The prevalence of mild xerophthalmia (XN an X1B) exists as a public health nutrition problem that has been consistently observed to rise with age, from the second year of life throughout the pre-school years.[1,9] Poverty is a root cause of food insecurity and resulting VAD disorder, so that reliable local indicators of low socio-economic status are usually associated with a 1.5 to 3 times higher risk of xerophthalmia in children. However, low predictive value (often ≤12%) limits the usefulness of socio-economic

status indicators for targeting high-risk individuals and households in deficient regions.[1]

Children in the school-going age group (6-16 years) represent 25% of the population in the developing countries.[10] They offer significantly descriptive material for these studies as they fall best in the preventable blindness age group and are easily accessible and schools are the best places for imparting health education to the children. Schools are also one of the best centres for effectively implementing the comprehensive eye healthcare program.[11]

Not so many studies have been carried out in recent years in India to analyse the prevalence of vitamin A deficiency in children aged 6-16 years. By assessing the prevalence, we will be able to find the major symptoms which are a contributing factor to vitamin A deficiency in relations to socio-economical status and BMI related risk factors.

METHODS

The study was designed to conduct in the areas of Taoru Tehsil of South Haryana. A total of 300 school children aged between 6-16 years from selected schools were included in the study. Childrens with age less than 6 years or more than16 years were excluded from the study. Informed consent from school principal and teachers was obtained.

Survey was carried out to gather information as per a pre-designed performa that included the identification data, socio-economical status, and ocular examination. Ocular examination was conducted by one optometrist and by one ophthalmologist by a bright illuminant torch in natural light as per WHO guidelines. If vitamin A deficiency was diagnosed then brief history of night blindness, or there were signs of conjunctival xerosis, bitot's spots, corneal xerosis and keratomalacia on clinical examination was done.

The socio economic status of the child's family was determined by using the modified Kuppuswamy scale. Education, occupation and income of both the father and mother were taken to calculate the socio economic status of the child. BMI Percentile was taken for each student.

Statistical analysis

Data entry and statistical analysis were done by using SPSS windows version 20.0 software. The Chi-square test was used to test differences in proportion. P <0.05 were considered statistically significant.

RESULTS

The present study was conducted on 300 school children. The socio-demographic profiles of all the students were presented in Table 1.

Table 1: Socio-demographic profile of school going children.

Variables	No. of students	%
Gender		
Boy	143	47.75
Girl	157	52.5
Age		
6-11 years	53	13.7
12-16 years	247	86.3
Religion		
Hindu	287	95.7
Muslims	13	4.3
Head of the family		
Father	283	94.3
Mother	17	5.7
Education of Father		
Illiterate	28	9.3
1-4	21	7.0
5-7	70	23.3
8-10	143	47.7
11-12	37	12.3
Graduate+	1	0.3
Education of mother		
Illiterate	91	30.3
1-4	26	8.7
5-7	97	32.3
8-10	75	25.0
11-12	11	3.7
Graduate+	0	0.0
Occupation of Father		
Farmer	78	26
Unskilled	95	31.7
Skilled	57	19.0
Private job	44	14.7
Expired	18	6.0
Govt.job	5	1.7
Business	3	1.0
Occupation of Mother		
House wife	284	94.7
Laborer	7	2.3
Farmer	4	1.3
Expired	3	1.0
Teacher	2	0.7
Family type		
Joint	164	54.7
Nuclear	136	45.3
BMI (kg/m^2)		
12.1-14	17	5.7
14.1-16	93	33.0
16.1-18	92	30.7
18.1-20	61	20.3
20.1-22	21	7.0
22.1-24	8	2.1
>24	2	0.7
No.of siblings		

1-2	57	19.0
3-5	209	69.7
6-10	34	11.3
Socioeconomic status		
Class III	48	16
Class IV	229	76.3
Class V	23	7.66

Table 2: Socio-demographic status of school going children in relation to VAD.

Variables	No. of students	%
Gender		
Boy	4	23.5
Girl	13	76.5
Age		
6-11 years	3	17.6
12-16 years	14	82.4
Education of Father		
Illiterate	1	5.9
1-4	2	11.8
5-7	8	47.1
8-10	2	11.8
11-12	4	23.5
Graduate+	0	0
Education of mother		
Illiterate	6	35.3
1-4	2	11.8
5-7	7	41.2
8-10	1	5.9
11-12	1	5.9
Graduate+	0	0
BMI (kg/m^2)		
12.1-14	4	23.5
14.1-16	6	35.29
16.1-18	7	41.17
18.1-20	0	0
20.1-22	0	0
22.1-24	0	0
>24	0	0
No.of siblings		
1-2	1	5.9
3-5	14	82.4
6-10	2	11.8
Socioeconomic status		
Class III	2	11.76
Class IV	14	82.35
Class V	1	5.88

In the present study, out of 300 children 17 (5.7%) were diagnosed with vitamin a deficiency. The prevalence of VAD was higher among girls 76.5% compared to boys 23.5, the difference was statistically significant (p <0.05).the association of VAD with age distribution, education status of the parents are found to non-significant. BMI distribution of students in relation with VAD are highly significant (p <0.001). The association of number of siblings and socio-economic status in relation to vitamin a deficiency was not significant (p >0.05) were given in Table 2. The birth order of the students and its relation to vitamin a deficiency was given in Table 3.

Table 3: Birth order and its association with VAD among school children.

Birth-order	Total no of students (%) (n=300)	No.of students with VAD (%)	
		Absent (n=283)	Present (n =17)
1	78 (26%)	75 (26.5%)	3 (17.6%)
2	99 (33%)	94 (33.2%)	5 (29.4%)
3	75 (25%)	72 (25.4%)	3 (17.6%)
4	21 (7%)	17 (6%)	4 (23.5%)
5	14 (4.7%)	13 (4.6%)	1 (5.9%)
6	10 (3.3%)	9 (3.2%)	1 (5.9%)
7	0 (0%)	0 (0%)	0 (0%)
8	1 (0.3%)	1 (0.4%)	0 (0%)
9	1 (0.3%)	1 (0.4%)	0 (0%)
10	1 (0.3%)	1 (0.4%)	0 (0%)
Total	300 (100%)	283 (100%)	17 (100%)

The prevalence of ocular morbidities in relation to VAD was given in Table 4. Out of 300 students 17 (5.6%) were reported with different ocular findings. Most of them exhibited bitots spot and one had night blindness and conjunctival xerosis. None had corneal xerosis, corneal ulcer and corneal scarring. The prevalence of ocular findings in association with VAD was statistically significant (p <0.001).

Table 4: Ocular findings in association with VAD among children.

Ocular findings	No. of students (n =17)	%
Night blindness	1	5.9
Conjunctival xerosis	1	5.9
Bitots spot	15	88.2

DISCUSSION

There is a substantial documentation of the prevalence, of vitamin A deficiency in preschool-aged children; extent of VAD in older children has not given much attention. Present study was carried out in primary school children (6-16 years age) from Taoru Tehsil area of south Haryana to see the prevalence of VAD.

In our present study out of 300 children aged between 6-16 years, prevalence of VAD was observed in 17 (5.7%) children which was lower than the prevalence of VAD

(9.1%) among school children in Aligarh reported by Sachdeva et al.[12] Evidence from various countries of South-eastern and Asian had shown VAD ranging from 0.2% to 15% in school aged children.[11] However, higher prevalence of ocular morbidity associated with VAD has been reported from neighbouring states of Haryana (58.8% in 4-18 years) and Rajasthan (71.7% in 4-16 years).[13]

In present study, highest number of cases was observed in age group 12 to 16 years (82.4%). The prevalence of VAD was higher among girls compared to boys and the difference observed was statistically significant. Similar observations was made with Chauhan et al and Bhattacharya et al.[14,15] The association of VAD and its consequences with socio-economic status was higher in class IV and V, than in social class III which was similar to the earlier reports of Chauhan et al and Pal et al.[16]

In our study a significant association was found between BMI of children with ocular abnormalities. All 17 patients with VAD were under weight. Similar observations were reported by Ahmed et al among school adolescents.[17] The prevalence of night blindness (5.9%) in the present study were comparable with the studies Gupta et al and the prevalence of bitots spot with 88.2% suggests a health problem of VAD according to WHO criteria.[10,18]

The results of the present study strongly suggest that screening of school children for ocular morbidities should be done at regular intervals and it should become one of the prime aspects of the educational health programme. For this, school teachers should be oriented and trained in identifying common eye problems among school children so that these children can be referred for immediate treatment. They should also communicate awareness regarding ocular hygiene among school children. In this manner the occurrence of preventable causes of blindness among school children will be minimized.

CONCLUSION

The present study concludes that presence of ocular morbidity in relation to vitamin A deficiency was observed in students with low socio-economic classes and underweight students. Prevention, early recognition, prompt treatment of ocular diseases by regular screening of students and nutritional education in schools would definitely decreases the risk of ocular abnormalities. So that the quality of eye sight of the students can be improved.

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