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Original Research Paper

Ophthalomology

ASSOCIATION BETWEEN LOW SERUM VITAMIN D LEVELS AND AXIAL LENGTH CAUSING MYOPIA IN SCHOOL CHILDREN

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ABSTRACT

Objective: To know and evaluate the association between serum vitamin D levels and axial length leading to myopia in 7±1yrs school going children. **Study Design:** This was an observational study conducted at the Department of Ophthalmology, maharajah's institute of medical sciences, vizianagaram, Andhra pradesh, from July 2022 - August. **Materials & Methods:** A total of 100 School children were tested for mono ocular visual acuity with the snellens chart from 6mts, ocular examination was done and Axial length was measured with IOL Master 500. Cycloplegic refraction was done at full dilatation. Myopia >-0.5D is taken into consideration. Non fasting blood samples were drawn by antecubital venipuncture and stored until analysis. Serum samples were collected in all children. The measurements of 25(OH)D (nmol/L) in the samples is taken. Mothers were asked to answer questions about the time spent outdoors and indoors watching tv/mobile for 0-4hrs and a questionnaire was prepared. **Results:** A total of 100 school children were taken for ocular examination for myopia and laboratory testing for serum vitamin D. Girls had smaller AL than boys but no sex predilection was observed for myopia occurrence. Out of 100 children : 49 are girls, 51 are boys of age 7yrs.Of these, 20 of 49 girls which accounts to 41% are myopic (>0.5 D) 22 of 51 boys which accounts to 43.1% are myopic showing no sex predilection .The odds of children being myopic with low vitamin D is 0.58 , while being non-myopic is 0.41. The odds of children being myopic with Optimal levels of VitD is 0.33, while being non myopic is 0.66 which is significant.In my study only 12% of non myopes have low vitamin D, 45% of non myopes are having optimal levels **Conclusion:** In conclusion, we found that serum levels of vitamin D were inversely related to AL, and that low levels increased the risk of myopia.

KEYWORDS : In conclusion, we found that serum levels of vitamin D were inversely related to AL, and that low levels increased the risk of myopia.

I. INTRODUCTION:

According to the World Health Organization's estimation in 2010, and, "Global Initiative for the Elimination of Avoidable blindness 2020", there were 285 million visually impaired persons in the world out of them 39 million are blind. In remaining 2.2 billion visually impaired persons 1 billion have distant vision impairment of which 88.4 mill are due to refractive errors forming 44% of the total .Which makes it the second most common cause. Of which only 36% are getting correction leaving majority of them with enormous problem in terms of public health burden, economic loss and social burden. Myopia can be corrected but etiological evaluation to adopt preventive measures is urgent from a Public health point of view.In India, myopia prevalence is 4-30%.

Although India is in tropical zone and despite of abundance of vitamin D, 75% of Indian population are suffering from Vitamin D deficiency. Vitamin D is shown as protective factor against Myopia.

AIMS&OBJECTIVES:

To know and evaluate the association between serum vitamin D levels and axial length leading to myopia in 7±1yrs school going children Time spent outdoors and indoors was taken into consideration.

MATERIALS & METHODS:

This study was conducted at the Department of ophthalmology, Maharajah's institute of medical sciences, andhra pradesh, from July 2022 - August 2023., following approval from the Ethical Committee of the Institute. A total of 100 School children were tested for mono ocular visual acuity with the snellens chart from 6mts, ocular examination was done and Axial length was measured with IOL Master 500. Cycloplegic refraction was done at full dilatation. Myopia >-0.5D is taken into consideration.

Non fasting blood samples were drawn by antecubital venipuncture and stored until analysis. Serum samples were collected in all children. The measurements of 25(OH)D (nmol/L) in the samples is taken. Mothers were asked to answer questions about the time spent outdoors and indoors watching tv/mobile for 0-4hrs and a questionnaire was prepared.

Inclusion Criteria:

7+-1 yrs old school children from nearby schools who visited ophthalmology department in MIMS during July 2022 - August 2023 were included.

Exclusion Criteria:

School children with anterior and posterior chamber abnormalities. Previous ocular surgeries and any previous Ocular Trauma were excluded.

l Verbal informed consent was obtained from all participant's parent's prior to their involvement in the study.

II. RESULTS

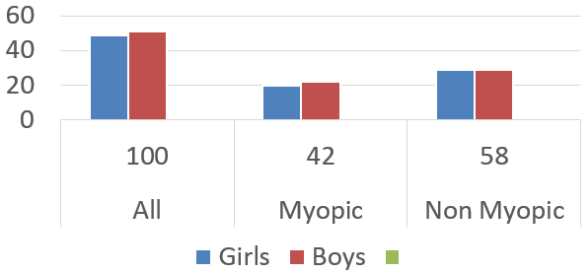
A total of 100 school children who visited Department of ophthalmology, Maharajah's institute of medical sciences, andhra pradesh, from July 2022 - August 2023 were taken for ocular examination for myopia and laboratory testing for serum vitamin D

Girls had smaller AL than boys but no sex predilection was observed for myopia occurrence

The questionnaire was taken from mothers., Children who stayed longer hours indoors watching mobile and TV had higher BMI , most of them are myopic too in comparison to the children who spent more time outdoors

Among the 100 children : 49 are girls, 51 are boys of age 7yrs .

Of these, 20 of 49 girls which accounts to 41% are myopic (>0.5 D) 22 of 51 boys which accounts to 43.1% are myopic showing no sex predilection



Mean Vitamin D levels (nmol/L)	Mean Axial length (mm)	
	Girls	Boys
200	22.1	22.22
150	22.34	22.41
100	22.5	22.63
50	23.31	23.45

Irrespective of gender, the Axial length showed a inverse linear association with the levels of Serum Vitamin D.

vitaminD	myope	non myope	Total
deficiency (<25-50nmol/L)	10(59%)	7(41%)	17
insufficiency (50-75nmol/L)	19(43%)	25(57%)	44
optimal >75nmol/L	13(33%)	26(67%)	39

The odds of children being myopic with low vitamin D is 0.58 , while being non-myopic is 0.41

The odds of children being myopic with Optimal levels of VitD is 0.33, while being non myopic is 0.66 which is significant. In my study only 12% of non myopes have low vitamin D, 45% of non myopes are having optimal levels

III. DISCUSSION

In young children, we found a significant association between serum VitD levels, AL and myopia. In this study children with lower serum levels of VitD had longer AL, and those with higher VitD had a lower risk of myopia. Studies outside India have proven Vitamin D as an independent risk factor in myopia. Wilhelm., et al. found that lower vitamin D levels was associated with larger axial lengths and higher risk of myopia. A study on a Korean population, who have a high prevalence of hypovitaminosis D like India, showed a higher risk of myopia among the deficient population

In a novel study by McMillan J who studied the effects of Vitamin D on the eye, serial Pentacam images of the eyes of deficient children were taken. It was noticed that, among siblings, presence of vitamin D deficiency was associated with irregular astigmatism which also showed mild improvement on supplementation.

In addition, the same was done on a pair of identical twins, one of whom spent most of her time outdoors and the other spending time indoors. Myopic progression was visible in the 'indoor twin' and not in the twin who played outdoors.

Eur J Epidemiol concluded theres no gender predilection in Vitamin D causing myopia

In Jones-Jordan et al prospective study, sports/outdoor activities were decreased in myopic subjects 3 years before onset of myopia, thus pointing to a relationship between outdoor exposure and myopia development.

In chinese population theres no association established between Vitamin D levels and Myopia development

IV. CONCLUSION

In conclusion, we found that serum levels of 25(OH)D were inversely related to AL, and that low levels increased the risk of myopia.Better results could be expected if the economical constraints are removed so that more data could be collected from larger sample to establish a stronger association

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