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ORIGINAL ARTICLE

Correlation of Serum Vitamin D Levels in Young Myopes

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Abstract

Background: Globally, myopia is a serious public health issue, and in recent years, its prevalence has been rising rapidly particularly in urban Asia. **Aims**: To determine the levels of serum vitamin D in young myopes and to find its correlation with myopia. **Material and Methods**: This was an hospital-based, cross sectional, observational study conducted in the Upgraded Department of Ophthalmology, Government Medical College Hospital, Jammu over a period of 6 months and included 56 patients with myopia and 56 patients as controls. All the myopic patients (n=56) underwent ophthalmologic examinations together with post cycloplegic refraction. Vitamin D levels of both the groups were measured. Data was then collected and analysed. **Results**: The mean age of myopes and controls were 17.20 ± 9.5 and 15.65 ± 8.9 years respectively. In the myopic group (n=56), 28.5 % had pre myopia, 39.2% had low myopia and 32.1% had high myopia. The mean serum vitamin D levels were 14.86 ± 7.64 ng/ml in myopic group and 26.03 ± 8.71 ng/ml in controls which was found to be statistically significant (P<0.01). There was a significant association between low serum vitamin D levels and myopia (p= 0.0002). In pre myopia patients we found out that 18.7% patients were having vitamin D deficiency while in patients with low myopia and high myopia the vitamin D deficiency was present in 45.4% and 61.1% respectively.**Conclusion**: In our study we found a significant association between low serum vitamin D levels and myopia (p= 0.0002). These findings suggest a potential association between myopia and vitamin D deficiency. In order to implement the role of vitamin D supplementation in young myopes, further longitudinal research must be conducted.

Key Words

Myopia, Young Myopes, Serum Vitamin D Levels

Introduction

Myopia is a common cause of correctable vision loss, with uncorrected myopia remaining the leading cause of distance vision impairment globally.[1] These results from an excessively curved cornea or from the eyeball being too long with respect to anterio-posterior diameter. It is also termed as near sightedness.[2] Mild myopia is relatively a benign disorder, and the blurred vision can be corrected with spectacles, contact lenses, or refractive surgeries. Whereas patients with high myopia which is > -6D are at increased risk of visual impairment and blindness due to the conditions such as retinal detachment, choroidal neovascularization and retinal degeneration.

Recent study estimating that about 30% of the world is currently myopic and by 2050, almost 50% will become myopic, that's a staggering 5 billion people.[2] The hot spots of myopia are East and South East Asia, where the

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prevalence of myopia is 80 to 90%.[3] In India prevalence varies according to different studies such as in community-based studies it has been recorded between 4 and 10% whereas in school-based studies it is between 10 and 20%.[4]

In recent studies the idea that vitamin D may be related to a higher risk of myopia while spending less time outside has given rise to the concept of "vitamin D hypothesis"[5]. Therefore, we decided to conduct a study to determine the association between vitamin D deficiency and myopia, if any so that vitamin D supplementation can be included in the treatment in order to prevent myopia progression.

Material and Methods

This was a hospital-based, cross-sectional, observational study conducted in the Upgraded Department of Ophthalmology, Government Medical College Hospital, Jammu over a period of 6 months from October 2023 to March 2024.The study was conducted after due approval from the Institutional Ethics Committee (IEC) of this institute (No: IEC/GMCJ/2022/1168 Dated:14-11-2022).

We included 56 young myopes and 56 age and sex matched controls within the age group of 15 to 24 years (older adolescent 15-19 years and young adults 20-24 years). Subjects were excluded if there was any significant history of ocular disease, refractive surgeries, any systemic disease associated with myopia like glaucoma, diabetes mellitus, marfans syndrome and down's syndrome. Also, patients whose ocular media opacities make it difficult to evaluate their fundus were excluded.

The subjects underwent visual acuity and refraction, slit lamp biomicroscopy and fundus evaluation using +90D lens. The applanation tonometer was used to measure the intraocular pressure. Retinoscopy was done under cycloplegia using tropicamide 0.8% and phenylepherine 5% into both eyes three times at the interval of 10 min.

Myopia was graded into pre-myopia, low myopia and high myopia as per International Myopia Institute Grading 2019.[1] Pre-myopia: spherical equivalent refractive error of >0 D to <-0.50 D; Low myopia: spherical equivalent refractive error of e"-0.50 to d"-6.00 D; and High myopia: spherical equivalent refractive error of e"-6.00 D, when ocular accommodation is relaxed.

5 ml of peripheral venous blood sample was taken from all participants for estimating serum 25-hydroxyl (OH) vitamin D levels using chemiluminescent immunoassay. Serum 25-OH vitamin D concentrations levels were compared between study group and control group and association between myopia and its severity grades was determined.

To categorize Serum 25-hydroxyl vitamin D levels, World Health Organisation criterion was used:[6]

- >30 ng/ml- optimal
- 20-29 ng/ml- Vitamin D insufficiency
- 20 ng/ml- Vitamin D deficiency.

Statistical Analysis

The statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 27. The values were represented as number and percentage (%), and mean ± standard deviation (SD). Comparison between the two groups was done by using unpaired sample t-test. The level of significance was defined as $p<0.05$ as significant.

Results

The age distribution of subjects was shown in Table 1. The mean age of cases and controls was 17.20 ± 9.5 and 15.65 ± 8.9 years respectively. The difference in mean age was not statistically significant (p=0.506).

Table 1: Age Distribution

Age Group (in years)	Cases	Controls	Statistical Significance	
	No. (%)	No. (%)	t-value	p-value
15-17	17 (30.3)	18 (32.1)	0.891	0.375
18-20	20 (35.7)	12 (21.4)		
21-23	14 (25)	15 (26.7)		
24	5 (8.9)	11 (19.6)		
Total	56	56		

The number of males was 29 (51.7%) in cases and 32 (57.1%) in controls whereas the number of females was 27 (48.2%) and 24 (42.8%) respectively. The difference between males and females was not statistically significant between the two groups (p=0.569).

The slit lamp and fundus examination of both the groups was normal. The mean IOP of cases and controls were 13±2.43 mmHg and 15.6 ± 3.22 mmHg respectively.

The mean vitamin D level was 26.30 ± 8.71 ng/ml in controls while in cases it was 14.99 ± 7.64 ng/ml. Hence,

Table 2: Comparison of Vitamin D Level Among Study Groups

Study Groups	No.	Mean Vitamin D value	Statistical Significance	
		Mean ± SD	t-value	p –value
Cases	**56**	14.86 ± 7.64	-7.215	<0.001
Controls	**56**	26.03 ± 8.71		

Table 3: Association of Vitamin D3 Values with Different Types of Myopia

25-OH-vitamin D levels	Cases (n=56)			Statistical Significance	
	Pre myopia	Low myopia	High myopia		
	No. (%)	No. (%)	No. (%)	Chi. Sq. Value	p value
Sufficient	9 (56.2)	5 (22.7)	2 (11.1)	10.23	0.037
Insufficient	4 (25)	7 (31.8)	5 (27.7)		
Deficient	3 (18.7)	10 (45.4)	11 (61.1)		
Total	16	22	18		

Table 4: Association of Vitamin D3 with Myopia

25-OH-vitamin D levels	Cases	Controls	OR (95%CI)	Statistical Significance	
	No. (%)	No. (%)		Chi. Sq. Value	p value
Sufficient	16 (28.6)	34 (60.7)	1 (reference)	13.63	0.0002
Insufficient	16 (28.6)	14 (25)	2.43 (0.96 - 6.16)		
Deficient	24 (42.8)	8 (14.2)	6.38 (2.35 - 17.27)		
Total	56	56			

vitamin D level was found to be low in cases as compared to controls with statistically highly significant difference ($p<0.001$) (Table 2).

Cases were divided into 3 groups as pre-myopia (16 patients), low-myopia (22 patients) and high myopia (18 patients). In pre-myopes 3 (18.7%) patients had vitamin D deficiency, in low-myopes 10 (45.4%) had deficient status whereas in high myopes 11 (61.1%) patients had vitamin D deficiency. The difference among myopic groups was found to be statistically significant ($p=0.037$).

In our study we found a significant association between the low serum vitamin D levels and myopia ($p=0.0002$) and it has been found that there is approximately 6 times risk of myopia in vitamin D deficiency (Table 4).

Discussion

Myopia is an eye condition which is influenced by both genetic and environmental factors.[1] It primarily affects people in East Asia and the Pacific as well as South Asia.

The presence of vitamin D receptor and vitamin D hydroxylases has been found in various ocular structures suggesting that ocular cells have the machinery to activate and regulate vitamin D metabolism. Recent studies showed that there is an inverse relationship of serum vitamin D with various ocular diseases like ARMD, cataract, diabetic retinopathy, dry eye disease.[7] Suggesting that vitamin D has a therapeutic potential.

In our study, the mean age was 17.20 ± 9.5 years in cases and 15.65 ± 8.9 years in controls. Mutti *et al*.[1] in their studies reported the mean age of 20.15 ± 5.42 years in cases and 18.68 ± 3.63 years in controls similarly Tao *et al*.[8] reported mean age of 15.1 ± 2.01 years and 15.0 ± 1.99 years respectively. Thus, the results of our study were comparable to the above-mentioned studies.

In our study, the males were 51.7% in cases and 57.1% in controls. Yazar *et al*.[9] reported 53.8% males in cases and 49.7% in controls, Mutti *et al*.[10] reported 57.1% and 37.5% respectively. Thus, the results of our study were comparable to the above-mentioned studies.

In our study the mean serum vitamin D level was 14.99 ± 7.64 ng/ml in cases and 26.30 ± 8.71 ng/ml in controls, Shah *et al*. [11] reported mean serum vitamin D level of 13.95 ± 3.75 ng/ml in myopes and 16.02 ± 5.11 ng/ml in non-myopes which was in comparison to our study. Mutti *et al*[10] reported mean serum vitamin D 13.9 ± 3.75 ng/ml in myopes and 16 ± 5.11 ng/ml in non-myopes. Thus, the results of our study were comparable to the above-mentioned studies.

In our study 18.7% of pre-myopes, 45.4% low myopes and 61.1% of high myopes had vitamin D deficiency and the difference among them was found to be statistically significant ($p=0.037$). Singh *et al*.[12] also reported in their study vitamin D deficiency of 7% in pre-myopes, 13% in low myopes and 46.60% in high myopes and the difference was statistically significant ($p<0.01$).

In our study we found out that there was a significant association between low serum vitamin D levels and myopia (p = <0.0002). Yazar *et al*.[9] in their study reported that lower serum 25(OH)D3 concentration was associated with higher risk of having myopia (p< 0.001). Jung *et al*. [13] reported that there was a significant association between low levels of serum vitamin D and myopia (p<0.001). Wolf *et al*.[14] also reported that there was a positive association between myopia and low serum vitamin D levels (p<0.02) whereas, Aaraj *et al*.[15] reported that there was no association between the serum vitamin D deficiency and the young myopic patients (p = 0.115).

Conclusion

In our study we found a significant association between low serum vitamin D levels and myopia (p=0.0002). These findings suggest a potential association between myopia and vitamin D deficiency. In order to implement the role of vitamin D supplementation in young myopes, further longitudinal research must be conducted.

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Conflict of Interest : Nil

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