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Assessment of Association Between Vitamin-D Levels and Dry Eye Syndrome Among Adult Population in Udaipur

Sandhya Nagda[1*], Nitin Salaria[2]
[1]*Resident, Department of Ophthalmology, Pacific Institute of Medical Sciences, Udaipur, India*
[2]*Professor and Head, Department of Ophthalmology, Pacific Institute of Medical Sciences, Udaipur, India*

***Abstract*: Background: With a high incidence of footfall in outpatient departments, Dry Eye Disease (DED) is a condition that arises out of a defect in functioning of the lacrimal unit. Among the etiological parameters, vitamin D deficiency has been highlighted as being a common cause for the same. Methodology: The study involved a pool of 100 subjects who were examined over a period of one year. The data collection included clinical examination, serum Vitamin D levels and OSDI score calculated from a pre validated standardized questionnaire. Results: A non-significant association was seen between Vitamin D levels and DED incidence in the selected study population.**

***Keywords*: Dry Eye Disease, OSDI Score, Questionnaire**

1. Introduction

One of the commonest complaints of patients who visit an ophthalmology OPD is that they have dry eyes., The range of symptoms include ocular discomfort, pruritus, redness, pain, and eye fatigue. Dry eye Disease (DED) is a set of clinical symptoms that arise out of defective lacrimal unit (1,2). Apart from the obvious physical discomfort, the affliction with DED is associated with a fall in quality of life and may even affect professional capabilities of individuals. The incidence of DED has been found to increase in the Asian subcontinent with a wider affliction in areas which are urban or semi urban (3,4).

The causality of DED has been extensively researched and literature has prescribed as Vitamin D levels among the culprits for causing DED. Vitamin D is a fat-soluble vitamin that is produced by cutaneous synthesis after sun exposure, and it has well-known musculoskeletal functions in the cartilage and bone. Vitamin D has also been reported to have protective effects against various health problems, such as cardiovascular disease (CVD), diabetes, malignancies, and some eye disorders. (5). The present study was done to assess the association between serum vitamin D levels and DED among adults based on the ocular surface disease index (OSDI).

2. Methodology

The present study was conducted over a period of 12 months from October 2020 to October 2021 in the Department of Ophthalmology of Pacific Institute of Medical Sciences, Udaipur. Institutional ethical approval was obtained prior to start of the study. The study included 100 adult subjects who came to outpatient department with complaints of dry eye. The subjects who had specific metabolic disorders, trauma, or previous eye surgery were excluded.

A written informed consent for inclusion in the study was obtained prior from the study participants. They were asked to fill a questionnaire and were advised laboratory blood investigation including Serum Vitamin D levels. The questionnaire is a DED-specific questionnaire that was developed by the Outcomes Research Group at Allergan, and consists of questions regarding vision-related function (4 questions), eye symptoms (5 questions), and environmental triggers related to DED (3 questions). Each question is scored from 0 to 4, and the total OSDI score is calculated using the following formula: OSDI = ([sum of scores for all questions answered] ×100) / ([total number of questions answered] ×4), with results on a scale of 0 to 100.

No DED (i.e., normal status) is defined as an OSDI score of < 13.0. The severity of DED is de- fined as mild (scores of 13.0-22.9), moderate (23.0-32.9), and severe (scores of 33.0-100.0). Previous studies have confirmed that the OSDI is a valid and reliable tool for measuring DED symptoms and their effects on vision-related quality of life. (6,7). The data was collected and recorded on a MS Excel worksheet and subjected to statistical analysis using SPSS ver 12 software to determine central tendency and significance.

3. Observations

The results revealed the following with regards to personal parameters of the study participants as depicted in table 01. The subjects were all residents of Udaipur District. Males had a slightly higher but statistically non-significant number as compared to females. None of the subjects were on any

*Corresponding author: som.sharmax@gmail.com

medications.

There were statistically significant differences between males and females.

Table 1
Personal Features of Study Participants

Characteristic	Number
Gender (Male: Female)	56:44
Age (Mean)	54.66 years
Systolic BP (Mean)	117.87mmHg
Diastolic BP (Mean)	78.22 mmHg
Smoking/Tobacco (%)	43 %
Education (Above High School)	87 %

Table 2
DED and Serum Vitamin D Levels

Grade of DED	Men	Women	Vit D levels (Mean)
NO DED	13	11	18.66 ng/ml
MILD	31	26	16.78 ng/ml
MODERATE	8	5	15.11 ng/ml
SEVERE	4	2	15.01 ng/ml

The observations revealed that based on OSDI scores, a total of 24 subjects fell in category of NO DED, among the rest, 57 had mild, 13 had moderate and 6 had severe DED. The serum Vit D levels showed an observable but non-significant difference between moderate and severe cases. However, a chi square analysis revealed that there was a significant difference in the mean serum Vitamin D levels between normal and DED subjects at 95 % confidence interval.

4. Discussion

The prevalence of DED in the present study was 76 %. When we considered only moderate/severe DED, the prevalence was 19 %. Previous studies have revealed that the prevalence of DED has risen from 4.3 to 73.5%, and our results are concurring with this range (8). It can be stated that the diagnosis of mild DED could cause the prevalence of DED to be overestimated as a majority of cases in our study were mild in nature. Some researchers have reported findings that may explain the gender-related differences, which could be related to differences in sex hormones or sunlight exposure times between men and women. In the present study, our findings did not find any significant difference between males and females in this regard (9).

In human studies, researchers have reported that vitamin D supplementation is an effective and useful treatment for patients with DED (10). Our results suggest that oral vitamin D supplementation is less likely to be effective than topical supplementation. The present study used OSDI scores to identify cases of DED, as this tool is valid and reliable for measuring DED symptoms and their effects on vision-related quality of life (11). We also compared individuals with and without DED, or with no/ mild DED versus moderate/severe DED, because mild symptoms may lead to a misclassification of DED. These analyses failed to detect a significant association between serum vitamin D levels and DED, and our findings support previous reports of no significant association between these variables. This absence of a significant association may be related to the possibility that serum vitamin D levels do not reflect the levels in lacrimal fluid. It is also possible that species-based or racial differences affect these associations, as previous studies regarding the protective effect of vitamin D were conducted in mouse models (12).

5. Conclusion

In the present study an observable but non-significant difference was seen in levels of Vit D and DED incidence. This association was not overt in itself but a difference was also observed when mean Vit D levels were compared in individuals with DED and without. However, this significance is not a definitive statemen on the validity or reliability of the same. It is safe to conclude that there may exist a causal association of Vit D levels and incidence of DED but this needs to be explored in a multifactorial manner in a larger population set with a wider demographic distribution.

1) *Conflict of Interest:* Nil
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