Original Research Article

Serum Vitamin D & Dry Eye Syndrome

Abstract

Introduction: Dry eye syndrome [DES] is one the commonest ocular disorders characterized by tear film instability, visual discomfort & disturbance with ocular surface inflammation potentially leading to damage to the ocular surface. Serum Vitamin-D deficiency has been reported to be associated with DES.

Aim: To determine the Serum 25-hydroxy-vitamin-D levels in patients diagnosed as having DES.

Methods: We conducted a prospective observational study and included in our study, serum vitamin D levels of the first 40 patients over the age of 18 years presenting with signs and symptoms and later diagnosed to have DES [confirmed with ocular surface disease index-OSDI questionnaire, Schirmer I test, kerato-epitheliopathy examination and tear-film breakup time-[TBUT] were analysed.

Results: Schirmers I test, interpreted as mild [11-15mm/5min], moderate [6-10mm/5min] and severe [<5mm/5min] had 8, 17 and 15 patients, respectively, with a mean value of 8mm/5min Schirmers I test. The minimum and maximum of Fluorescein TBUT measured in seconds was 4 and 10 seconds, respectively, with a mean of 6.2 seconds. Twenty four of our test subjects were found to have deficient Serum Vit 25[OH] D levels, nine had insufficient levels and seven had normal levels.

Conclusion: Vitamin D deficiency is prevalent in patient having DES.

Abbreviations: TBUT, Serum Vit 25[OH] D, DES, OSDI.

Introduction

Dry eye syndrome [DES] is one the commonest ocular disorders characterized by tear film instability, visual discomfort & disturbance with ocular surface inflammation potentially leading to damage to the ocular surface.[1,2] [1,2]. Tears have a protective effect on our ocular surface and any abnormalities of tears or disorders of the ocular surface may lead to DES.[3] [3]. Pain and irritation accompanying DES have a profound deleterious effect on the quality of life of the patient.[4] Activation of the innate immune

components in ocular cells leading to chronic inflammation and increase in the tear osmolarity play a significant role in the pathogenesis of DES.[5] [4] Des can be divided into two types, namely, aqueous deficiency type and the evaporative type.[2] Aqueous deficiency DES is caused by reduced tear secretion from the lacrimal glands, whilst the evaporative type is thought to be due to the inflammation of the eyelid margin and the dysfunction of the meibomian glands.[2] Chronic ocular pain and fatigue are the commonest complaints of the patients from DES.[6] Treatment usually comprises of artificial tears, anti-inflammatory drugs, autologus serum and punctual occlusion.[7] Serum Vitamin-D deficiency has been reported to be associated with DES.[8] Vitamin-D plays an immune-modulatory role via both the innate and adaptive immune systems and one of its active metabolites 1,25-dihydroxy-vitamin-D regulates cytokine production and cell proliferation.[9,10] Moreover Serum 25-hydroxy-vitamin-D levels give the most accurate measure of the Vitamin-D status of our body.[11]

Aim

To determine the Serum 25-hydroxy-vitamin-D levels in patients diagnosed as having DES.

Materials & Methods

This study was conducted at Sub-District Hospital Chadoora, Directorate of Health Services Kashmir, J&K from March 2016 to April 2018 and was a prospective observational study. We included in our study, the first 40 patients over the age of 18 years presenting with signs and symptoms and later diagnosed to have DES [confirmed with ocular surface disease index-OSDI questionnaire, Schirmer I test, kerato-epitheliopathy examination and tear-film breakup time-TBUT]. The OSDI consisted of twelve questions, each given five points [0, 1, 2, 3, 4]. Then OSDI was calculated by dividing 25 times the sum of scores attained by total number of questions answered [out of the questionnaire of twelve] and matching the results with the OSDI table. Schirmers I test was graded as mild, moderate and severe with values of 11-15, 6-10, <5 mm/5min respectively. TBUT, generally, >10 seconds was considered normal, 5-10 seconds as marginal and <5 seconds as low. Serum 25-hydroxy-vitamin-D were ascertained by chemi-luminescence and the values were <50, 50-74, 75-250 and >250 nmol/l as deficient, insufficient, sufficient and potential intoxication, respectively. The exclusion criteria from the study group were previous eye surgery, malignancy, any chronic or immune disease, smokers or pregnant/ breast feeding females. An informed consent was taken before including the patients

in our study group. Data pertaining to age, gender, BMI, OSDI, TBUT, Schirmers I test and Serum 25-hydroxy-vitamin-D levels was collected and analysed.

Results

Our study group comprised of fourty patients, amongst these the youngest and the eldest subject were 18 and 72 years of age respectively [Table 1]. The mean age of our study group was 52 years. We had six male and thirty four female patients making up 15% and 85% of the sample size, respectively. The basal metabolic index [BMI] of our study subjects ranged from 18[minimum] to 32[maximum], with a mean value of 24.2. Schirmers I test, interpreted as mild [11-15mm/5min], moderate [6-10mm/5min] and severe [<5mm/5min] had 8, 17 and 15 patients respectively. The mean value being 8mm/5min Schirmers I test. The minimum and maximum of Fluorescein TBUT measured in seconds was 4 and 10 seconds, respectively, with a mean of 6.2 seconds. Serum Vit 25[OH] D levels were 7nmol/lt and 240 nmol/lt as minimum and maximum levels, respectively, with the mean being 49.12nmol/lt. Twenty four of our test subjects were found to have deficient Serum Vit 25[OH] D levels, nine had insufficient levels and seven had normal levels.

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Discussion

The youngest patient in our study group was 18 years old and the eldest was 72 years old. The mean age of our study group was 52 years. Jeon DH, et al reported a mean age of 53 years in their study, although their study group had 740 subjects. [12] Similarly Yoon SY, et al found the mean age of their study group to be 50.88 years.[11] this points to the fact that DES commonly affects the middle age group.

Our study group comprised of 34 females [85%] and six male [155] patients in a ratio of 5.7:1, respectively. Bae SH, et al had 84 women [80%] and 21 men [20%] in their study group with a ratio of 4:1, respectively. Yoon SY, et al had 1411 [77%] and 411 [23%] female and male patients with a ratio of 3.4:1, respectively in their study group.[11] The gender difference as compared to our study group with others could be due to the greater number of patients in the other studies but all the studies show a preponderance of DES in the female population as has been found by our study too.

Basal metabolic index in our study had a range of 18-32 kg/m^2 with a mean of 24.2. Jeon DH, et al reported a body mass index of 23.6 comprising of 740 subjects [487 females and 253 males].[12]

The mean value of Schirmers test in our study group was 8.85mm/5min and accordingly 8, 17, & 15 patients were classified as having mild, moderate and severe tear deficiency, respectively. Meng YF, et al in their study group "lower serum vitamin D level was associated with risk of dry eye syndrome", while considering the Schirmers test have concluded that their DES group had a significantly lower mean value of 9.4+/-3.9mm/5min as compared to 13.9+/-5.3mm/5min mean value of their control group, with a statistically significant p-value of <0.001.[14] Kurtul BE, et al also reported that in patients having DES, Vitamin D deficiency significantly decreased Schirmers test values.[15]

We found that fluorescein TBUT had a mean value of 6.2 seconds, with 4 and 10 seconds being the minimum and maximum values, respectively. Meng YF, et al had a mean of 6.1+/-2.4 seconds in their DES study group patients with a statistically significant p-value of <0.001 in comparison with their control subjects.[14] The most commonly employed method of assessing tear instability is TBUT.[16] Kurtul BE, et al have also stated that Vitamin D deficiency decreases TBUT .[15]

The mean Vitamin D levels of our study group were 49.12 nmol/lt, whilst 7nmol/lt and 240nmol/lt were the minimum and the maximum values, respectively. Meng YF, et al have also reported that Serum 25(OH) levels were significantly lower in DES subjects of their study [19.3+/-5.8ng/ml] as compared to their control subjects [31.6+/-7.3], which was statistically significant, p-value <0.001.[14] Seok Hyun Bae, et al also found deficient levels of Vitamin D [10.52+/-4.61] in DES subjects of their study group.[13]

Conclusion

In our study we found that Vitamin D deficiency is prevalent in patient having DES. Although it will be premature to conclude that whether Vitamin D deficiency plays a significant or insignificant role in DES as sample size of our study group is small and probably larger sample size is needed to ascertain the role of Vitamin D in the pathogenesis of DES.

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Table 1

Parameter		Value	Mean
Age	Min	18years	52
	Max	72years	

Gender	**Male**	**6**	
	Female	**34**	
BMI	**Min**	**18kg/m^2**	**24.2**
	Max	**32kg/m^2**	
Schirmers	**Mild**	**8mm/5min**	**8.85**
	Moderate	**17 mm/5min**	
	Severe	**15 mm/5min**	
Fluorescein TBUT	**Min**	**4 seconds**	**6.2**
	Max	**10 seconds**	
S Vit 25[OH]D	**Min**	**7 nmol/l**	**49.125**
	Max	**240 nmol/l**	

Conflict of Interest/competing interest: None

Consent: Duly informed consent was taken from every study subject.

Ethical approval: The local ethical committee approved the study.

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