

Serum Vitamin D & Dry Eye Syndrome

Abstract

Introduction: Dry eye syndrome [DES] is one of 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: Schirmer's 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 of 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

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

45 Aim

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

48 Materials & Methods

49 This study was conducted at Sub-District Hospital Chadoora, Directorate of Health
50 Services Kashmir, J&K from March 2016 to April 2018 and was a prospective
51 observational study. We included in our study, the first 40 patients over the age of 18
52 years presenting with signs and symptoms and later diagnosed to have DES
53 [confirmed with ocular surface disease index-OSDI questionnaire, Schirmer I test,
54 kerato-epitheliopathy examination and tear-film breakup time-TBUT]. The OSDI
55 consisted of twelve questions, each given five points [0, 1, 2, 3, 4]. Then OSDI was
56 calculated by dividing 25 times the sum of scores attained by the total number of
57 questions answered [out of the questionnaire of twelve] and matching the results with
58 the OSDI table. Schirmers I test was graded as mild, moderate and severe with values
59 of 11-15, 6-10, <5 mm/5min respectively. TBUT, generally, >10 seconds was
60 considered normal, 5-10 seconds as marginal and <5 seconds as low. Serum 25-
61 hydroxy-vitamin-D were ascertained by chemiluminescence and the values were <50,
62 50-74, 75-250 and >250 nmol/l as deficient, insufficient, sufficient and potential
63 intoxication, respectively. The exclusion criteria from the study group were previous
64 eye surgery, malignancy, any chronic or immune disease, smokers or pregnant/
65 breastfeeding females. Informed consent was taken before including the patients in

66 our study group. Data about age, gender, BMI, OSDI, TBUT, Schirmer's I test and
67 Serum 25-hydroxy-vitamin-D levels were collected and analysed.

68 Results

69 Our study group comprised of forty patients, amongst these the youngest and the
70 eldest subject were 18 and 72 years of age respectively [Table 1]. The mean age of our
71 study group was 52 years. We had six male and thirty-four female patients making up
72 15% and 85% of the sample size, respectively. The basal metabolic index [BMI] of our
73 study subjects ranged from 18[minimum] to 32[maximum], with a mean value of 24.2.
74 Schirmer's I test, interpreted as mild [11-15mm/5min], moderate [6-10mm/5min] and
75 severe [<5 mm/5min] had 8, 17 and 15 patients respectively. The mean value being
76 8mm/5min Schirmers I test. The minimum and maximum of Fluorescein TBUT
77 measured in seconds was 4 and 10 seconds, respectively, with a mean of 6.2
78 seconds. Serum Vit 25[OH] D levels were 7nmol/lit and 240 nmol/lit as the minimum
79 and maximum levels, respectively, with the mean being 49.12nmol/lit. Twenty four of
80 our test subjects were found to have deficient Serum Vit 25[OH] D levels, nine had
81 insufficient levels and seven had normal levels.

82 **PLACE YOUR TABLETS HERE**

83 Discussion

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

89 Our study group comprised of 34 females [85%] and six male [15%] patients in a ratio
90 of 5.7:1, respectively. Bae SH, et al had 84 women [80%] and 21 men [20%] in their
91 study group with a ratio of 4:1, respectively. Yoon SY, et al had 1411 [77%] and 411
92 [23%] female and male patients with a ratio of 3.4:1, respectively in their study
93 group.¹¹ The gender difference as compared to our study group with others could be
94 due to the greater number of patients in the other studies but all the studies show a
95 preponderance of DES in the female population as has been found by our study too.

96 The basal metabolic index in our study had a range of 18-32 kg/m² with a mean of
97 24.2. Jeon DH, et al reported a body mass index of 23.6 comprising of 740 subjects
98 [487 females and 253 males].¹²

99 The mean value of Schirmer's test in our study group was 8.85mm/5min and
100 accordingly, 8, 17, & 15 patients were classified as having mild, moderate and severe
101 tear deficiency, respectively. Meng YF, et al in their study group "lower serum vitamin
102 D level was associated with risk of dry eye syndrome", while considering the
103 Schirmers test have concluded that their DES group had a significantly lower mean
104 value of 9.4+/-3.9mm/5min as compared to 13.9+/-5.3mm/5min mean value of their
105 control group, with a statistically significant p-value of <0.001.¹⁴ Kurtul BE, et al also
106 reported that in patients having DES, Vitamin D deficiency significantly decreased
107 Schirmers test values.¹⁵

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

114 The mean Vitamin D levels of our study group were 49.12 nmol/lt, whilst 7nmol/lt and
115 240nmol/lt were the minimum and the maximum values, respectively. Meng YF, et al
116 have also reported that Serum 25(OH) levels were significantly lower in DES subjects
117 of their study [19.3+/-5.8ng/ml] as compared to their control subjects [31.6+/-7.3],
118 which was statistically significant, p-value <0.001.¹⁴ Seok Hyun Bae, et al also found
119 deficient levels of Vitamin D [10.52+/-4.61] in DES subjects of their study group.¹³

120 Conclusion

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

126 **PLEASE MOVE TABLE 1 UP AND PLACE IT UNDER YOUR RESULT DESCRIPTION.**

127 Table 1

Parameter		Value	Mean
Age	Min	18years	52
	Max	72years	

Gender	Male	6	
	Female	34	
BMI	Min	18kg/m²	24.2
	Max	32kg/m²	
Schirmer's	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	

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129 **Conflict of Interest/competing interest: None**

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

131 **Ethical approval: The local ethical committee approved the study.**

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