DRY EYE SYNDROME: UNDIAGNOSED ENTITYM. Ramesh Chandra¹, Govardhan Reddy², P. Kishore Kumar³, D. V. Giddaiah⁴, P. Sanjeeva Kumar⁵**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: Dry eye disease is a multifactorial disease of the tear film and ocular surface that results in symptoms of discomfort, visual disturbance, and tears film instability with potential damage to the ocular surface. It is accompanied by increased osmolality of tear film and inflammation of the ocular surface.¹ The symptoms become progressively troublesome and exert an increasing burden on the patients as the disease progresses or increases in severity. If not detected early it can lead to sight threatening complications. This study was undertaken to assess the prevalence, clinical features, diagnosis and management of dry eye patients attending the outpatient department of Santhiram Medical College and General Hospital, Nandyal.

KEYWORDS: Dry eye syndrome, artificial tears, watering.

INTRODUCTION: The precocular tear film is a hydrated mucus gel that contains soluble antimicrobial proteins and growth factors that protect and support the ocular surface. The final common pathway in dry eye is a perturbation of the integrated ocular surface/lacrimal gland reflex unit.²

Reported prevalence of dry eye is diverse, with questionnaire based surveys documenting rates ranging from 14.4% to 33% of the population sampled.³⁻⁶ Studies which also involve tests of tear function including Schirmer's test, tear break up time, fluorescein staining, or rose bengal staining for determination of dry eye have found generally lower prevalence rates.³⁻⁷

There are only three published reports on prevalence of dry eye among hospital-based.

Population from North and Eastern India and the prevalence varies between 18.4% and 40.8%.⁸⁻¹¹ One small study from high altitude showed a higher prevalence of 54%.¹²

It can be caused by deficiency of any one or more of the tear film components, or can be a component of systemic diseases, including Sjogren's syndrome, lupus and Stevens-Johnson syndrome. Additionally, factors such as contact lens wear and adverse environmental exposures such as arid environments, windy conditions or visual tasking can exacerbate the symptoms of dry eye.

AIMS OF THE STUDY: To determine the prevalence of dry eye in symptomatic patients attending the Ophthalmology OPD in Santhiram Medical College, Nandyal.

To evaluate the clinical features, diagnostic tests and treatment of dry eye disease.

PATIENT AND METHODS: The study was conducted on 70 patients who presented with symptoms suggestive of dry eye. It was a one year cross sectional study with the study period ranging from December 2011 to November 2012.

INCLUSION CRITERIA: Patients equal to and above 20yrs presenting with following symptoms and signs - Burning sensation, Sandy gritty feeling, Foreign body reaction, Photophobia, Heavy lids. The above symptoms increase in conditions of low humidity and wind.

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EXCLUSION CRITERIA: Patients less than 20yrs with h/o Increased mucoid discharge and watery secretion suggestive of vernal keratoconjunctivitis, Alkali burns, Trachoma, Acute ocular infections, Ocular surgery within last 6 months, Impaired ectropion, Contact lens users, eyelid function like in bell's palsy, nocturnal lagophthalmos,

Of the 70 subjects who were included in the study, 4 had undergone cataract surgery in one the eyes. That eye was excluded and the other eye was considered for the study.

Written informed consent was taken before enrolling the patients in the study. An OSDI questionnaire was administered to all participants to assess the symptoms of dry eye and correlate them with the signs.

- A complete slit-lamp examination of the lid margins, tear meniscus, conjunctiva, and cornea and tear film was done. Relevant examination of other important ocular structures was done. Following this, tests to diagnose dry eye were performed. These are tear break up time(TBUT), Rose Bengal staining, Schirmer's tests 1 and 2.
- Participants were labeled as having dry eye if at least two out of these four diagnostic tests were positive. This criterion of two diagnostic tests to diagnose dry eye was adopted in order to increase the detection rate of dry eye and hence arrive at an accurate prevalence.

RESULTS:

Characteristics	Number
Total number of patients	70(136)
Age group	>20 years
Schirmer test positive	56 eyes
Tear film break up time positive	26 eyes
Rose Bengal test positive	51 eyes
Dry eye present (2 or more tests positive)	34 patients (56 eyes)
Dry eye absent	36 patients (80eyes)
Table 1: Characteristics of the study population	

The total number of patients examined in our study was 70. The eyes included in the study were 136. The age group was between 21 to 70 years, with the mean age of the patients being 47.92 years. Of the total number of patients, 57 were females and 13 were males with a female to male ratio of 4.38:1. Among the entire group, 34 patients (56 eyes) were diagnosed to have dry eye based on the tests.

Age (years)	Dry eye present No. of patients (%)	Dry eye absent No. of patients (%)	Total No. of patients (%)
21-30	0	5(100%)	5
31-40	6(31.5%)	13(68.42%)	19
41-50	8(53.53%)	7(46.66%)	15
51-60	12(60%)	8(40%)	20
61-70	8(72.72%)	3(27.27%)	11
Total	34	36	70
Table 2: Dry eye in relation to Age distribution			

$$\chi^2 - 9.089 \text{ p}=0.028(\text{S})$$

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The entire study population was divided decade wise into subgroups and the relationship of age with dry eye prevalence was studied. The youngest patient was of 21 years and the oldest was 65 years. Mean age was 47.96 ± 11.55 years.

Sex	Dry eye present	Dry eye absent	Total
Females	29(85%)	28	57
Males	5(15%)	8	13
Total	34	36	70

Table 3: Dry eye in relation to sex distribution

$\chi^2 - 0.653$ $p = 0.419$.

There were 57 females and 13 males in the study group with the females to male ratio being 4.38:1.

OSDI	No. Of patients
0	6
1-33	45
34-66	12
67-100	6
Total	70

Table 4: OSDI Scores

The ocular surface disease index (OSDI) was administered to the patients before subjecting them to examination or tests. Of the entire study group, 27.1% responded with symptoms of moderate to severe dry eye.

OSDI scores	Dry eye present	Dry eye absent	Total no. Of eyes
0	0	12	12
1-33	39	50	89
34-66	7	16	23
67-100	10	2	12
Total	56	80	136

Table 5: OSDI scores and correlation with dry eye

$\chi^2 - 10.174$ $p = 0.006(S)$.

The eyes of the patients showing positive symptoms were then analysed and the symptoms were compared with the signs to look for correlation between symptoms and signs.

An OSDI scoring of 67-100 which corresponds to severe dry eye, was found to correlate significantly with objective tests of dry eye ($p = 0.006$). Similar findings were noted by Ozcura et al¹³ who evaluated the OSDI questionnaire for diagnosis of dry eye and found a significant inverse correlation between OSDI and TBUT scores. Simpson TL et al¹⁴ scoring system is highly sensitive in

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have found that this symptomatic and differentiating asymptomatic subjects of dry eye. Srinivasan et al¹⁵ used the OSDI scoring system to detect dry eye in postmenopausal women and concluded that OSDI could be effectively used to separate post-menopausal women who demonstrate clinical signs of ocular dryness.

Dry mouth	Dry eye present	Dry eye absent	Total
Present	12	5	17
Absent	22	31	53
Total	34	36	70

Table 6: Presence of dry mouth

The patients were asked for history dry mouth during recruitment into the study. This data was used to assess the number of people presenting with both dry mouth and dry eye. 12 patients (17.14%) were found to have evidence of both dry mouth and dry eye. 5 patients (7.1%) had a history of dry mouth but no evidence of dry eye.

Signs	Dry eye present	Dry eye absent	Total
Conjunctival congestion	21	11	32
Corneal dryness	15	0	15

Table 7: Signs of dry eye

$\chi^2 - 10.327$ $p = 0.001$ (VS)

Refractive error	Dry eye present	Dry eye absent	Total
Present	24	16	40
Absent	10	20	30
Total	34	36	70

Table 8: Relationship between refractive error & dry eye

$\chi^2 - 4.880$ $p = 0.027$ (S)

Study by Jie et al¹⁶ has shown that there was significantly higher incidence of dry eye among people with under corrected refractive errors. It has been postulated that persons with refractive errors have an increased tendency to rub their eyes which apart from introduction of infective material, sebum and sweat could cause the lodgement of particulate foreign substances into the eye that predispose to tear film instability. Also, people with uncorrected refractive errors have more tendency to squeeze the eye, causing instability of tear film, predisposing to dry eye.

Schirmer test	Dry eye present	Dry eye absent	Total
Positive	51	5	56
Negative	5	75	80
Total	56	80	136

Table 9: Results of Schirmer test

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A total of 56(41.17%) eyes gave a wetting of less than 10mm on performing the Schirmer test. Among these, 51 were proved to be positive for dry eye based on pre-determined diagnostic criteria. The Schirmer test showed a sensitivity of 91.1% and specificity of 93.7%. The positive predictive value of the test was found to be 91.07% and the negative predictive value was 93.7%.

Schirmer(mm)	0-5	6-10	>10	Total
No. Of patients	20	11	39	70
% of patients	28.6	15.7	55.7	100

Table 10: Distribution of patients according to Schirmer test results

Among the 31 patients who gave a positive result for dry eye based on the schirmer test in one or both eyes, 20 patients (28.6%) had a wetting of less than or equal to 5mm. The rest i.e. 11 patients(15.7%) had wetting of between 6 to 10mm in one or both eyes, which is indicative of mild moderate dry eye.

TBUT	Dry eye present	Dry eye absent	Total
Positive	26	0	26
Negative	30	80	110
Total	56	80	136

Table 11: Results of tear film break up time(TBUT) test

TBUT was the second test to be performed. It was found to be positive (<10 seconds) in 26 eyes (19.11%). All the eyes which gave a positive result showed objective evidence of dry eye. This test was found to have a sensitivity of 46.4% and specificity of 100%. Its positive predictive value was 100% and negative predictive value was 72.7%.

Rose Bengal test	Dry eye present	Dry eye absent	Total
Positive	48	3	51
Negative	8	77	85
Total	56	80	136

Table 12: Results of Rose Bengal test

A total of 51 eyes (37.5%), showed positive staining. Among these, 48 eyes(94.1%) were positive for dry eye. The test was found to have a sensitivity of 85.7% and specificity of 96.2%. The positive predictive value of the test was 94.1% and negative predictive value was 90.6%

Drugs	Dry Eyes treated (%)
Artificial tears	46 eyes (82.14%)
Doxycycline	10 eyes (17.85%)

Table 14: Treatment in patients diagnosed with dry eye

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Out of 56 eyes 46 were treated with artificial tears. 10 eyes with meibomian gland disease were treated with only Doxycycline 100 mg twice daily for 3 weeks and then at follow up the dose was titrated depending on the response.

In a study by Aragona et al¹⁷ has shown that long term treatment with sodium hyaluronate containing artificial tears improves rose bengal stains with dry eye, suggesting that treatment with this agent promotes corneal and conjunctival epithelial healing. This effect was noted after 3 months of starting the treatment.

In a study conducted by Horwarth-Winter et al, to evaluate the clinical course of dry eye syndrome, during follow-up subjective symptoms improved in 68% of the patients who received treatment. Subjective symptoms were unchanged in 30% of patients and increased in 2%

OSDI Score	1 week	3 week	6 week
0	0	0	1 (2.08%)
1-33	39(69.6%)	38(74.5%)	39 (81.2%)
34-66	7(12.5%)	5(9.8%)	4 (8.3%)
67-100	10(17.8%)	8(15.6%)	4 (8.3%)
Total	56 eyes	51 eyes	48 eyes

Table 15: Comparision of OSDI Score during follow up:

Out of the 56 dry eye cases, 5 cases did not report for first follow-up. Out of the remaining 51 dry eye cases, 3 did not report for the 2 follow-up. Table shows a rise in OSDI score in 1-33 i.e. mildly symptomatic cases (74.5% during 3rd week of follow up and 81.2% during 6th week). Patients who were moderate to severely symptomatic reported a fall in OSDI scores. 2.08% of the cases were totally symptom free at the end of 6 weeks

Schirmer (in mm)	1st week	3rd week	6th week
0-5	34(60.7%)	30(58.8%)	28(58.3%)
6-10	22(39.2%)	20(39.2%)	17(35.4%)
>10	0	1(1.9%)	3(6.25%)
Total	56 eyes	51 eyes	48 eyes

Table 16: Comparision of Schirmer test during follow-up

Patients with schirmer < 5mm remained about 58.8% during first follow-up and 58.3% during second follow-up. Schirmer more than 10 was noted in 1.9%during first follow-up and 6.25% during second follow-up.

Rose Bengal test	1st week	3rd week	6th week
Positive	48(85.7%)	42(82.35%)	39(81.25%)
Negative	8(14.2%)	9(17.6%)	9(18.75%)
Total	56eyes	51eyes	48eyes

Table 17: Comparision of rose bengal test during follow-up

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Rose Bengal test was positive in 82.35% during first follow-up and 81.25% during second follow-up. It was negative in 9 eyes during both first and second follow-up.

CONCLUSION: Dry Eye Syndrome itself cannot be prevented, notably because most of the cases are due to the aging process. However, these guide lines are helpful to ease the discomfort and further complications.

To avoid excessive air movement: To avoid hot, dry environments and to add moisture to the air. To wear glasses on windy days and goggles while swimming: To take frequent breaks: To position the computer screen below eye level: To stop smoking and avoid passive smoking: To use hot compresses and eye massage¹⁸: To instill artificial tears/lubricating gels:

Dry eye is an under-diagnosed ocular disorder. This is because diagnosis and assessment of dry eye are complicated by the considerable variation in disease symptoms and signs and lack of definitive diagnostic tests.

GOAL - To treat and manage patients of dry eye disease at any level. To find out etiological factors responsible. To treat any complications – in patients with severe dry eye. To train comprehensive ophthalmologists.

Dry eye evaluation with an appropriate and standard questionnaire along with standard tests for dry eye helps in diagnosis and treatment. This will go a long way in the effective and successful management of patients with dry eye, specially so as the disease is chronic and needs long term treatment. Early and appropriate management will provide ocular comfort and satisfaction with a better quality of life.

Among the 70 patients studied, prevalence of dry eye was found to be as high as 48.5%.

The prevalence of dry eye increased with increase in age and significantly higher among people more than 40 years of age was prevalence was higher among females when compared to males. Conjunctival congestion was found to be reliable sign of dry eye with a strong positive association.

People with refractive errors, with or without history of spectacle use, had a higher incidence of dry eye compared to emmetropes. OSDI was found to be reliable measure of dry eye symptoms. Higher, scores of OSDI, indicating severe dry eye, correlated well with diagnostic tests for dry eye.

Schirmer test showed a high sensitivity and specificity, followed by rose bengal tests and impression cytology. TBUT was significantly decreased in cases with meibomian gland disease.

46 dry eye cases were treated with artificial tears. 10 cases who showed evidence of meibomian gland disease were treated with doxycycline.

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