



**ORIGINAL RESEARCH PAPER**

**Ophthalmology**

**COMPARISON OF DRY EYE TESTS BY USING SCHIRMER'S AND PHENOL RED THREAD IN YOUNG ADULTS**

**KEY WORDS:** PRT-Phenol Red Thread,ST-Schirmer's Test,DE-Dry Eye.

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**ABSTRACT** **Aim:** This study aims to compare dry eye tests using Schirmer's and Phenol red thread test clinically. **Methods and Material:** It was hospital-based comparative study conducted in the outpatient department of Ophthalmology. This study was done on 50 subjects, age group between 18-25 years, subjects with emmetropia and refractive errors were included. Participants were subjected to comprehensive ophthalmic examination, dry eye measurements was done by using Schirmer's strip and Phenol red thread test.. The test was done on both the eyes and the mean values were calculated. **Results:** Mean (28.08) wetness observed in Schirmer's test was significantly more than the mean (27.12) wetness observed using Phenol red thread test for both the eyes. **Conclusions:** Schirmer's test is more accurate and reliable in measuring dry eye as compared to Phenol red thread test.

**INTRODUCTION**  
 This study aims to compare dry eye test and determine its reliability between Schirmer's and PRT clinically. Schirmer's test was introduced over hundred years ago and still commonly used in clinical practice<sup>1</sup>. It estimates lacrimation in humans<sup>2</sup>. It uses Whatman filter paper strip, patient is directed to look upwards, bent end of strip is positioned in lower eyelid, after 5 minutes strip is removed & measured<sup>1</sup>. Phenol red thread test theorized to measure residual tear film<sup>2</sup>. Patients typically tolerate it well as only a soft thread is touched to lid and results are obtained in 15 seconds per eye<sup>3</sup>.

**SUBJECTS AND METHODS**  
 This study has been approved by IRB Committee, before beginning this study informed consent has obtained and the procedures explained clearly. The participants enrolled in this study with the age group of 18-25 years. All participants were subjected to comprehensive ophthalmic examination including standard clinical examination, Schirmer's test and phenol red thread test was done to find out the reliability, Schirmer's test uses a Whatman filter paper strips which is 35mm in length and 1mm in breadth. The patient is directed to look upward, and the patient's eyelid was pulled down. The bent end of the test strip are positioned in the eye such that it rests between the palpebral conjunctiva of the lower eyelid and the bulbar conjunctiva of the eye after 5 minutes the paper was then removed and the amount of moisture was measured after that Phenol red thread was used in which subjects were instructed to maintain their eyes in a straight-ahead gaze and to blink naturally. This 3mm thread portion is placed on the palpebral conjunctiva at the lateral one-fifth of the lower lid. The remaining portion of the thread hangs down over the cheek of the subject. After 15 seconds, the thread was softly removed and measured. The results were interpreted for Schirmer is given as for normal value which is ≥10mm wetting of the paper after 5 minutes. Tear deficiency which is <5 mm wetting of the paper after 5 minutes. For phenol red thread the wet length <10 mm is indicated as severe dry eye, ≤19mm as borderline dry eye, and >20 mm as normal tear production. The resultant values are compared and a hypothesis was formulated. For the analysis of data, the t value was used.

**RESULTS**  
 A sample of 50 young adults (men and women) was included in the study. Dry eyes testing were conducted by two methods: Schirmer's test and Phenol red thread test. This section

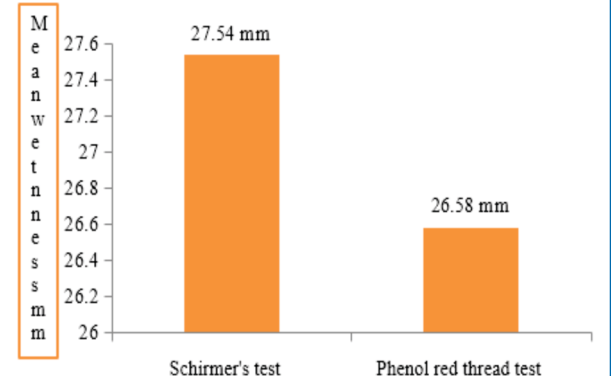
presents the comparison of Dry eye test (OD), (OS), (OU) using Schirmer's test and Phenol red thread test. For this purpose Paired samples t-test is applied. The results are shown in the Table-I

**Table-I: Dry eye testing (OD) (OS), (OU) using Schirmer's test and Phenol red thread test:**

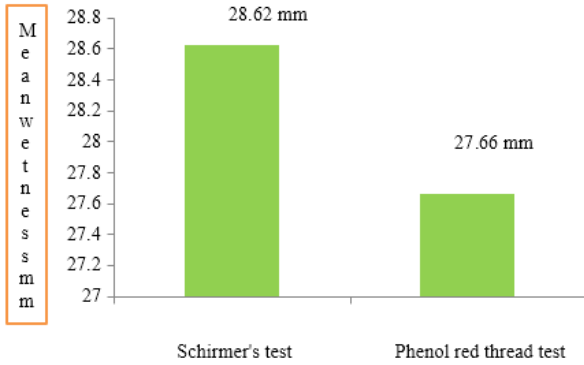
EYE	TEST	Mean	S.D	Tvalue
Right Eye (OD)	Schirmer's test	27.54 mm	7.921	24.001**
	Phenol red thread test	26.58 mm	7.913	(p=.000)
Left Eye (OS)	Schirmer's test(mm)	28.62 mm	8.322	23.214**
	Phenol red thread test(mm)	27.66 mm	8.309	(p=.000)
BOTH EYE (OU)	Schirmer's test(mm)	28.08 mm	8.101	34.114**
	Phenol red thread test(mm)	27.12 mm	8.090	(p=.000)

Source: Computed from Primary data

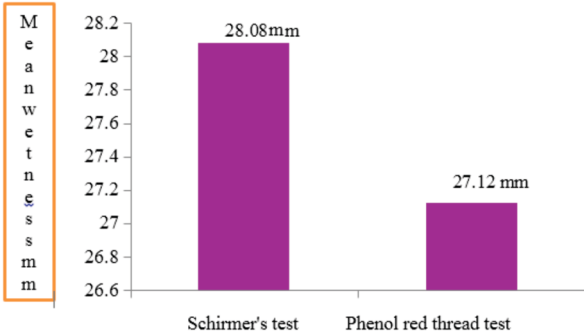
From the Table I, the t-value of (OD) 24.001(p=.000), (OS) 23.214(p=.000), (OU) 34.114(p=.000) confirms that there is significant difference observed between Schirmer's test and Phenol red thread test with respect to Dry eye testing (OD) (OS). Further the mean wetness observed in Schirmer's test OD (27.54), OS (28.62), OU (28.08) is significantly more than the mean wetness observed using Phenol red thread test OD, (26.58) OS (27.66), OU (27.12) This confirms that the Schirmer's test is showing more wetness as compared with Phenol red thread test in Dry eye testing OD, OS The comparison is shown graphically in Figure-I, II & III



**Figure-I: Dry eye testing(OD) using Schirmer's test and Phenol red thread test**



**Figure-II: Dry eye testing(OS) using Schirmer's test and Phenol red thread test**



**Figure-III :Dry eye testing(OU) using Schirmer's test and Phenol red thread test.**

**DISCUSSION**

Dry disease may be a multifactorial disease of the tears and ocular surface that causes tear film inability with potential damage to the ocular surface<sup>4</sup>.Tears are often inadequate and mostly unstable for several reasons<sup>5</sup>. This tear instability ends up in inflammation and damage of the eye's surface. Schirmer's test is believed to live reflex tear production and possibly residual volume of tears within the eye<sup>6</sup>.

The phenol red thread is theorized to live the degree of the residual tear film within the inferior Conjunctival sac of the attention<sup>7</sup>. Both the tests determine whether the attention produces enough tears to stay it moist. These tests are used when an individual experiences very dry eyes or excessive watering of the eyes<sup>8</sup>The key finding within the present study while comparing Schirmer's and phenol red thread test shows that Schirmer's test found to be more accurate in measuring dry eye than phenol red thread test because it's simpler and lighter<sup>10</sup>.

Nichols et al. found while assessing relationship between symptom of dry eyes and various tear film test, no patient had an abnormal phenol red thread and Schirmer's test combination. He showed only weak agreement between the two tests; this is often possibly because each test measures different aspects of the tear film. This might result to the absence of symptoms that's specific to dry eye and also to the various mechanism by which each test differentiates between normal and dry eyes<sup>11</sup>.

**CONCLUSION**

Significant difference observed between Schirmer's test and Phenol red thread test with respect to dry eye testing in OD, OS and OU. Mean wetness observed in Schirmer's test is significantly more than mean wetness observed using Phenol red thread test. Therefore its concluded that the Schirmer's test were showing more wetness as compared with Phenol red thread test in dry eye testing.

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