

# Dry Eye Disease among Pregnant Women at a Tertiary Care Hospital in Kashmir

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**Abstract:** ***Objective:** The objective of this study was to determine the prevalence of dry eye disease (DED) across different trimesters among pregnant women in Kashmir. **Patients and Methods:** This cross sectional longitudinal study was conducted in the department of Ophthalmology, Government Medical College, Srinagar. 80 Pregnant women were included in the study irrespective of gestational age. DED was assessed objectively using Tear Break-up Time (TBUT) and Schirmer's test. **Results:** A total of 80 pregnant women participated in the study. The mean age of the women was 27.40 years. Majority of the patients were in the age group of 26 to 30 years and majority in the third trimester. The prevalence by TBUT test was 87.5% and by Schirmer's test it was 26.25%. The association between gestational age and dry eyes by Schirmer's test was statistically significant ( $p$  value=0.038). **Conclusion:** This study shows the importance of a routine eye examination to check for dry eyes disease during pregnancy. Hence, screening of all pregnant women for dry eye disease will create awareness on pregnancy related dry eye disease, which in turn will facilitate early recognition, and thereby prompt treatment where necessary.*

**Keywords:** Dry eye disease; Pregnancy; Schirmer's test; TBUT

## 1. Introduction

Pregnancy is characterized by many significant changes in a woman's body which helps develop the foetus optimally. During pregnancy, there is marked maternal endocrine up regulation, hormonal profile modifications and interactions [1]. These are required for appropriate anatomical and physiological adaptations needed for optimal fetal development, nourishment and smooth delivery at term [2]. However, the physiological effects of these hormones often go beyond the reproductive system and affect other organs including eye and its adnexae [3]. In the eye, all structures could be affected ranging from anterior segment to the posterior segment [4, 5]. In the anterior segment, tear film and intraocular pressure are often affected. However, while the intraocular pressure response to pregnancy is usually hypotensive, the accompanied changes in lacrimal function usually leads to dry eyes [6]. A higher prevalence of dry eye has been reported in human and experimental studies during pregnancy [6, 7]. It is known that the quality of life decreases significantly overtime during pregnancy and it is even worse in the case of pathological pregnancy [8]. Pregnancy is associated with depression and other psychosomatic conditions [9]. This implies that pregnancy places women in a vulnerable state of health. Every little effort to alleviate the challenges in pregnancy is critical. Dry eye disease needs not compound the precarious situation pregnant women face daily. This implies that treating and researching dry eye disease in pregnant women is worthwhile. Pregnancy is associated with hormonal and metabolic changes, which alter the physiology of many body tissues [10, 11]. During pregnancy, the changes in hormones, metabolism, hemodynamic, vascular and immunological response can affect the eye, especially the ocular surface tissues instigating changes, which may be transient but in some cases permanent [12, 13].

Dry eye disease is a prevalent ophthalmic disease and it is the most common reason for patients visiting ophthalmic practitioners [14]. The etiology of dry eye disease is multifactorial and often multiple instigators contribute to the clinical manifestation of the disease [14]. Dry eye disease is a common pregnancy ailment that usually begins towards the end of the first trimester. It usually continues throughout the pregnancy and possibly for a few months postpartum. In addition to dry eyes, other subtle eye changes can occur in pregnancy, causing irritation and sometimes difficulty in wearing contact lenses. Dry eyes in pregnancy is due to hormonal changes, particularly a decline in the male androgen hormone. The symptoms of dry eye are wide and varied: burning eyes, gritty sensation in the eyes, itchy eyes and light sensitivity. There is a decrease in the tear production which also leads to dry eyes. There is also change in the consistency of tears which contributes to the development of dry eyes [5, 6]. Globally the prevalence rate of DED is estimated to be between 7 to 37% [15,16]. However, the prevalence is reported to be higher in Asian countries accounting for 60.0% to 73.3% [17-19].

Numerous studies on dry eye disease have been conducted globally, majority of these studies however have been performed on the general population and post-menopausal women. Very few studies on dry eye disease during pregnancy have been reported. Skare [7] and core searchers assessed the prevalence of lacrimal dysfunction during pregnancy and compared it with non-pregnant women. Although, a higher prevalence of dry eye was reported among the pregnant, there was no difference in Schirmer's reading between the two groups [7].

A study conducted in Africa to study the tear film functions among pregnant women showed a higher prevalence of dry eye disease in pregnancy than that of non-pregnant women [20]. A longitudinal study conducted in Nigeria showed that

there was an increase in dry eye disease during the second and third trimesters of pregnancy [21]. A review article by Pitas M et al [3] also showed that there was an increased prevalence of dry eyes among pregnant women.

A prevalence of 22.8% of dry eye disease was reported from a hospital based study in Egypt [22]. Likewise, a study among postmenopausal women in North India showed a high prevalence of dry eye disease accounting for 73.3% [17]. The prevalence of dry eye disease among postmenopausal women ranges from 27% to 60% in studies reported from different parts of India [18].

At present, there is a dearth of data on pregnancy-related ocular changes in Nepal. The few studies that have been conducted, are mainly on the retinal changes during pregnancy induced hypertension [1]. These studies are mostly population based where the prevalence of dry eyes disease was reported between 66.0% to 69.0% in the general population, diabetic patients and postmenopausal women respectively [23, 24].

## 2. Patients and Methods

This was a descriptive cross sectional study conducted at the Ophthalmology department of Government Medical College, from August 2018 to August 2020. Eighty pregnant women without selection for gestational age were included in the study. Informed and verbal consent of each participant was obtained before the study after informing the participants of the purpose of the study and confidentiality of results. A detailed history including demographic data, as well as symptoms like ocular discomfort, burning sensation, gritty sensation, foreign body sensation and tearing were asked from all pregnant women who volunteered for this study. All pregnant women irrespective of the age who were free from all form of systemic or ocular disease that can affect tear film function such as blepharitis, conjunctivitis, preexisting glaucoma, use of topical eye medication within three months before presentation were included.

Dry eye disease was confirmed by the following tests:

Tear break up time: Filter paper stained with Fluorescein was inserted into the inferior fornix of the subject. The patient was asked to blink several times in order to distribute the fluorescein evenly. Under broad beam and blue cobalt light, the time interval (seconds) between the last blink and the appearance of first randomly distributed black spot on the cornea was noted using a stop watch.

TBUT was graded as follows:

> 10 sec=normal

6-10 sec = mild to moderate dry eye

< 5 sec = severe dry eye

Schirmer's Test 1:

The eye was mobbed dry and the folded end of a 35mm long and 5mm wide pre-calibrated (mm) Whitman no 41 filter paper was gently inserted into the junction between the lateral 1/3rd and medial 2/3rd of the lower fornix without touching the cornea. The extent of the wetting (mm) after 5 minutes using stop watch was recorded as the tear film function. It was graded as follows:

>15mm after 5 min=normal

14-9mm after 5 min=mild dry eye

8-4mm after 5 min= moderate dry eye

<4mm after 5 min =severe dry eye

Diagnosis was made if either or both the tests were positive. Anterior segment evaluation was done using slit lamp biomicroscopy

## 3. Data Analysis

The obtained data were entered and analyzed with SPSS software version 17. Variables were summarized using mean and standard deviation. Data were presented in tables, and student t-test. P value less than 0.05 was considered significant.

## 4. Results

A total of 80 women in all trimesters of pregnancy participated in this study. The minimum age was 20 years and maximum 35 years. Mean age in our study was 27.40 years with maximum in the age group of 26 to 30 years. Majority of the participants were from Rural areas and majority were homemakers by occupation. Socio-demographic characteristics were given in Table 1:

**Table 1**

Socio demographic characteristics of the patients		
Age (in years)	N	%
20-25	28	35
26-30	42	52.5
31-35	10	12.5
Residence		
Rural	55	68.75
Urban	25	31.25
Occupation		
Homemakers	55	68.75
Agriculture	15	18.75
Teachers	10	12.5

The descriptive data regarding the frequency of dry eye disease by TBUT test and Schirmer test is given in Table 2.

**Table 2**

Frequency of dry eyes in TBUT test and Schirmer's test			
	N	%	95% CI
TBUT	70	87.5	
Schirmer test	21	26.25	

The comparison between the different grades of dry eyes in TBUT test and Schirmer's test is exhibited in Table 3.

**Table 3**

Comparison of dry eyes between TBUT test and Schirmer's test				
Dry eyes	TBUT		Schirmer	
	N	%	N	%
Mild to moderate dry eyes	45	56.25	13	16.25
Severe dry eyes	25	31.25	8	10
Total	70	87.5	21	26.25

Association between gestational period and dry eyes in TBUT test and Schirmer's test are shown in Tables 4 and 5, where the association between gestational period and dry

eyes was statistically significant in Schirmer's test, (p value 0.038), but not in TBUT test (p value 0.864). It is observed that in both tests the frequency of dry eyes increases with the increase in the gestational period.

**Table 4:**

Association of dry eyes and gestation period in TBUT test					
	Normal eyes		Dry eyes		p-value
	N	%	N	%	
Ist trimester	2	2.5	12	15	0.864
2 <sup>nd</sup> trimester	3	3.75	23	28.75	
3 <sup>rd</sup> trimester	5	6.25	35	43.75	
Total	10	12.5	70	87.5	

**Table 5**

Association of dry eyes and gestation period in Schirmer's test					
	Normal eyes		Dry eyes		p-value
	N	%	N	%	
Ist trimester	5	6.25	3	3.75	0.038
2 <sup>nd</sup> trimester	20	25	8	10	
3 <sup>rd</sup> trimester	34	42.5	10	12.5	
Total	59	73.75	21	26.25	

Though the prevalence of dry eyes among pregnant women was high in TBUT test amounting to 87.5%, it was observed that more than 90% (92.5%) had no symptoms of dry eyes like burning sensation, foreign body sensation, tearing and gritty sensation. This stresses the importance of carrying out TBUT test to assess the presence of dry eye disease during pregnancy.

## 5. Discussion

Dry eye disease (DED) is a multifactorial disorder of the tear film and ocular surface due to tear deficiency or excessive tear evaporation causing damage to interpalpebralocular surface and associated with symptoms of foreign body sensation, dryness, blurring of vision, photophobia and tear film/ instability. Globally the prevalence rate of DED is estimated to be between 7 to 37% [9, 10]. However, the prevalence is reported to be higher in Asian countries ranging from 60.0% to 73.3% [17, 18, 24].

Most of the dry eye studies were focused on the general population and postmenopausal women. However, the few studies that have been carried out on pregnancy and dry eye disease have shown an association between them [4, 5]. Studies have shown changes in lacrimal function during pregnancy leads to dry eyes [6, 7]. Hormonal imbalance during pregnancy has been postulated to give rise to dry eye.

A total of 80 females in different trimester of pregnancy were recruited for this study, the age ranged from 20 to 35 years, with mean age of 27.40. Majority of the patients in our study were in the age group of 26 to 30 years. This is in concordance to a study by Nwachukwu Nkiru Z et al [21] and Rizayal et al [25].

The prevalence of DED in our study was found to be 87.5% in TBUT test and 26.25% in Schirmer's test. The high prevalence of DED found in the present study was similar to that reported in a study conducted among pregnant women by Skare et al [7], and Rizayal et al [25], who attributed the high prevalence of DED to lacrimal dysfunction. There was higher prevalence of DED in TBUT than in Schirmer's test,

which is similar to our findings. The present study showed results similar to studies performed in Africa [21] and Nepal [25] where the prevalence of dry eyes was 75.2% in TBUT test and 24.5% in Schirmer's test respectively. The findings of the present study were however, inconsistent with those of Waheed A W et al [20] who reported a decrease in the TBUT among pregnant women, but an increase in Schirmer's test values. This disparity might be due to the dissimilarity of study designs, as their study was based on case-control design, while ours was based on cross-sectional design.

A prevalence of 22.8% of dry eye disease by Schirmer's test was reported from a hospital based study in Egypt [22], and is consistent with our results.

In this study, the prevalence of DED was highest in the third trimester in both TBUT test and Schirmer's test accounting for 43.75% and 12.5% respectively. It is observed that in both tests the frequency of dry eyes increases with the increase in the gestational period. The increase in prevalence of DED in the third trimester in this study corroborated the findings reported in similar studies by Nwachukwu Nkiru Z et al [21], Wong J et al [26] and Rizayal et al [25].

Hormonal changes during pregnancy may cause a reduction in the quality and quantity of secretion from meibomian glands which will in turn enhance tear evaporation and consequently contribute to the development of DED. These hormones have been reported to increase as pregnancy progresses, reaching their peak in the third trimester [27]. This might be attributed to the highest prevalence of DED and the most DED symptoms during the third trimester. A previous study in Nigeria reported an increase in estrogen and progesterone from the second to third trimester [28]. In this study, the association between gestational period and dry eyes was statistically significant in Schirmer's test, (p value 0.038), but not in TBUT test (p value 0.864).

In our study, the patients who came for routine checkup, only 6 patients comprising 7.5% had clinical symptoms of DED, such as ocular discomfort, tearing, gritty sensation. More than 9 out of 10 patients (92.5%) had no symptoms of dry eyes, however by TBUT test the prevalence of dry eye disease was 87.5%. This is in accordance to the study conducted by Rizayal et al [25], but different to a study conducted by Singh P et al [23] where the patients who complained of symptoms were 61%. The discrepancy in findings can be attributed to the dissimilarity in the target population.

## 6. Conclusion

In conclusion, this study showed that dry eye disease is a common problem during pregnancy which reported a high prevalence of 87.5% by TBUT test, with the highest prevalence during the third trimester accounting for 43.75%. Majority of the patients were in the age group of 26 to 30 years. More than 9 out of 10 patients (92.9%) had no symptoms of dry eyes, even though almost 90% prevalence of dry eye disease was reported by TBUT test. Therefore, this study shows the importance of a routine eye examination to check for dry eyes disease during pregnancy.



Hence, screening of all pregnant women for dry eye disease will create awareness on pregnancy related dry eye disease, which in turn will facilitate early recognition, and thereby prompt treatment where necessary.

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