



## ANALYSING DRY EYE INCIDENCE IN HYPOTHYROID PREGNANT WOMEN IN TRIBAL POPULATION OF SOUTH RAJASTHAN

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**ABSTRACT** Dry eye is the most frequent cause of the ocular discomfort in Thyroid-associated ophthalmopathy (TAO) and has been found to be present in 60% to 90% of hypothyroid pregnant patients (1). Present study evaluates the tear function tests in pregnant patients with hypothyroidism, risk factors for dry eye including pregnancy all gestation periods, free plasma thyroxine, proptosis, upper eyelid margin-reflex distance, and long duration of the disease. 52 patients with hypo-thyroidism with pregnancy were included in this study. The presence of thyroid-associated ophthalmopathy and tear function tests were evaluated clinically. present study aims at finding incidence, an early diagnosis and suggest preventive measures to avoid complications.

**KEYWORDS :** Dry Eye disease, ocular complications in pregnancy, hypothyroidism and eye disease, graves disease, Hashimotos thyroiditis, thyroid associated ophthalmopathy,(TAO)

### INTRODUCTION

Thyroid-associated ophthalmopathy (TAO) is an autoimmune disorder of the extraocular muscles and surrounding orbital connective tissue including lacrimal gland which is generally associated with Graves' disease (GD) and rarely accompanies Hashimoto's thyroiditis [2]. The characteristic clinical findings of the TAO include proptosis due to an increase in the retroorbital soft tissue, lid retraction, restrictive extraocular myopathy, optic neuropathy, and inflammatory ocular surface disorders (3). T-cell-dependent inflammation of the ocular surface and increased tear film evaporation and osmolarity due to lid retraction and exophthalmus play an important role in ocular surface drying (4). Besides, it has been shown that lacrimal gland is a target organ for thyroid hormone which expresses thyroid hormone receptor  $\beta$ -1 (Thrb). Chronically reduced thyroid hormone levels were found to modulate the expression of Thrb in lacrimal gland, thus causing a decrease in tear production and subsequent dry eye in experimental studies (5) Although most of the studies showed the presence of dry eye in Graves' disease, it has been rarely studied in Hashimoto's disease.

### MATERIAL AND Methods

Prospective study has been conducted from Apr 2019 to Dec 2021. Place of study has been Tertiary Care Hospital at Pacific Institute of Medical Sciences Umarda Udaipur. All antenatal patients were screened for presence of hypothyroidism. Those patients with clinical features suggestive of hypothyroid state and TSH levels more than 4.0 mu/l on two tests were included. Maternal age, parity, education, socio-economic status, period of gestation is recorded. Pre-existing maternal disease, anemia, hypertension, heart disease and liver disease were recorded. Maternal weight at first visit, maternal height, total ante natal visits, obstetric complications, drug and medication use, tobacco use were recorded. Maternal symptoms, amenorrhea swelling feet, weakness headache, bleeding or discharge per vagina were recorded. Physical findings, anemia, swelling feet and body, were recorded. all cases of hypothyroid state referred to ophthalmology department for thorough evaluation of dry eye and its severity. Laboratory studies, t3, t4 and TSH levels, hemoglobin, leucocyte count, blood sugar, urea, creatinine, liver enzymes ,urine albumin and sugar were recorded. Imaging studies, gestational age, ultrasonography were also recorded. Pregnancy outcomes included gestational age at delivery, birth weight, mode of delivery, and Apgar scores were recorded. Observation fetal weight at birth and sex of neonate.

52 patients of pregnancy with hypothyroidism were included in the study. The local ethics committee's approval was received for the study and informed consent of the participating subjects was obtained. Patients were excluded from the study if they had any other ophthalmic

disorder, had undergone any ophthalmic surgery, or had any additional systemic disease or radioactive iodine treatment within the prior 1 year. The diagnosis of hypothyroidism was based on standard clinical criteria and confirmed by thyroid function testing and thyroid antibody tests [8]. The laboratory findings of patients including free plasma thyroxine (fT4) and thyroid stimulating hormone (TSH) levels were recorded.

All patients were evaluated by a single experienced ophthalmologist for the presence of ophthalmopathy and dry eye. The diagnosis of ophthalmopathy was based mainly on the clinical state (eyelid retraction, periorbital swelling, diplopia, and others). The grade, severity, and activity of the cases were classified according to the NOSPECS classification . The lid retraction was assessed by measuring the upper eyelid margin-reflex distance (UER), which is the distance between the centre of the pupillary light reflex and upper eye lid margin in primary gaze position. A measurement of 3–5 mm is considered as normal and measurement greater than 5 mm was considered as UER. According to Hertel measurements, difference of >2 mm between two eyes or proptosis of >20 mm was accepted as significant proptosis. The ocular surface disease index (OSDI), Schirmer tear test (without topical anaesthesia), and tear break-up time (TBUT) were performed in all patients.

### Observations

**Table 1 Maternal Age distribution of dry eye**

s.no	Age in years	No of patients	percentage
1	Less than 20	23	44.23
2	20- 25	22	42.30
3	26-30	3	5.76
4	31-35	3	5.76
5	36 and more	1	1.95
		52	100

**Table 2 Maternal Parity distribution of cases of dry eye**

s. no.	Parity	Number	Percentage
1	0	24	46.17
2	1	19	36.54
3	2	3	5.76
4	3	3	5.76
5	4	1	1.92
6	5	2	3.85
		52	100

**Table 3 Maternal ante natal care education socio economic status distribution in dry eye**

s.no	Maternal antenatal visits	No of patients	percentage
1	nil	35	67.32
2	1-2	15	28.84
3	3 and more	2	3.84
Maternal education			
4	Less than class 5	41	78.85
5	Class 5 to class 10	8	15.39
6	More than class 10	3	5.76
Socio economic class			
7	Very low	38	73.08
8	low	10	19.24
9	middle	2	3.84
10	high	2	3.84

**Table 4 maternal risk factors in dry eye**

S.no	Maternal risk factors	number	percentage
1	Period of gestation		
	First trimester	07	13.46
	Second trimester	20	38.46
	Third trimester	25	48.08
2	TSH LEVELS		
	4.0 MU/L TO 6MU/L	4	7.69
	7MU/L TO 9MU/L	21	40.38
	MORE THAN 9 MU/L	27	51.92
3	SEVERITY OF DRYNESS		
	MILD TO MODERATE	40	76.92.
	SEVERE	4	7.69

**Table 5 ocular manifestations in hypothyroid in pregnancy**

sn	Thyroid eye symptoms	no	Percentage
1	Redness and itchiness	38	73.07
2	Pain with movement	38	73.07
3	Irritation described as gritty feeling	32	61.53
4	Sensivity to light	23	44.23
5	dry eyes and or watery eyes	44	85
6	Eyes that bulge and protrude	3	5.76
7	Double vision caused by the eye shifting out of alignment	1	1.95
8	Blurring to blindness of vision	0	0

## Result

Max out of total 52 cases 23(44.23%) were less than 20 years and 22(42.30%) were less than 25 years 3 (5.76%) were less than 30 years and 4 (7.69) % were more than 30 years. 48(92.30%) cases were less than 30 years of age. 43 (82.69%) cases were primigravida and para 1. 9 (17.30 %) cases were para2 and above 35(67.32%) were totally unbooked without single antenatal visit, 15(28.84%) had 1-2 visits and 2 (3.84%) had regular antenatal visit 41(78.85%) were illiterate 8 (15.39%) were less than 10 standard and 3(5.76%) were more than 10 standard 38(73.08%) were very low socioeconomic status, 10(19.24%) were of low 2(3.84%) were middle and 2 (3.84%) were from high status. 07 (13.46%) were in first trimester, 20(38.46%) were in second trimester and 25 948.08% were in third trimester. 4 (7.69%) had TSH levels 4-6 mu/l ,21(40.38%) had 7-9 mu/l and 27(51.92%) had more than 9 mu/l. 40 (76.92%) had mild to moderate dryness and 4 had severe dryness. 38(73.07%) had redness and itchiness, 38 (73.07%) had pain with movement 32 (61.53%) had irritation described as gritty sensation 23(44.23%) had sensitivity to light 44 (85%) had various degrees of dryness 3 (5.76%) eyes bulge and protrude 1(1.95%) had double vision

## 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 interpalpebral ocular surface and associated with symptoms of foreign body sensation, dryness, blurring of vision, photophobia and tear film/ instability. (6) Globally the prevalence rate of DED is estimated to be between 7 to 37%. (7) However, the prevalence is reported to be higher in Asian countries ranging from 60.0% to 73.3% (8) In the global index, dry eye studies were mostly

focused on the general population and postmenopausal women(9). However, the few studies that have been carried out on pregnancy and dry eye disease have shown an association between them.(10) During pregnancy, all structures in the eye could be affected ranging from anterior segment to the posterior segment. In the anterior segment, tear film and intraocular pressure are often affected (11). However, while the intraocular pressure response to pregnancy is usually hypotensive, the accompanied changes in lacrimal function usually leads to dry eyes(12). A higher prevalence of dry eye has been reported in human and experimental studies during pregnancy. (13) 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.(14) These hormones have been reported to increase as pregnancy progresses, reaching their peak in the third trimester. This might be attributed to the highest prevalence of DED and the most DED symptoms during the third trimester.(15) A previous study in Nigeria reported an increase in estrogen and progesterone from the second to third trimester. In this study, the association between gestational period and dry eyes was statistically significant in Schirmer's test, (p value 0.048), but not in TBUT test (p value 0.789). The participants in our study came to the hospital for routine antenatal visits, 85% had clinical symptoms of DED, such as ocular discomfort, tearing, gritty sensation. This is different to a study done by Singh P where the patients who complained of symptoms were 61%.(16) The discrepancy in findings can be attributed to the dissimilarity in the target population. The meibomian gland functions normally when there is a balance between testosterone and estrogen.

The mechanism behind the secretion of tear film components has been investigated for several years. For optimal functioning of meibomian glands, a delicate balance between pro secretory (testosterone) and anti-secretory hormones (estrogen) must be actively protected. This is because while testosterone enhances the development and differentiation of this gland, estrogen promotes acinar cell death leading to reduction in size of the gland and decrease in secretion. In pregnancy, though there is an upregulation in the secretion of estrogens, progesterone and testosterone, there is also a simultaneous increase in testosterone binding protein (TBP) with attendant depletion of biologically active free testosterone. (17) Additionally, the sharing of the same cellular receptor by small biologically active testosterone and high level of progesterone further aggravates the reduced pro-secretory activity of testosterone on Meibomian glands. In conclusion, this study showed that dry eye disease is a common problem during pregnancy

It has been demonstrated in this study that dry eye was found to be more common in pregnant patients with hypothyroidism and both proptosis and deficiency of fT analysis showed that both proptosis and fT4 levels were significantly associated with dry eye. Numerous studies have investigated the pathogenesis of dry eye associated with TAO. One of the suggested mechanisms is that increased lid fissure width and proptosis due to increased orbital volume in TAO accelerate tear film evaporation and increase tear film osmolarity. Gilbard and Farris reported that the tear osmolarity of patients with thyroid eye disease was abnormally high( 18). Our results showed that degree of proptosis was significantly higher in the patients with Hashimoto's thyroiditis than in the healthy subjects.

The TBUT was significantly lower in patients with Hashimoto's thyroiditis suggesting an unstable tear film. (19) We believe that increased width of the palpebral fissure which results from the proptosis in patients may have an impact on ocular surface drying and tear hyperosmolarity. Hyperosmolarity is not the sole mechanism and inflammation may have a possible effect for the development of dry eye in TAO patients as well. In a study, dry eye symptoms and findings in GD patients were compared to those in healthy controls. Although the mean palpebral fissure height and the amount of proptosis did not statistically differ between the patients and the control subjects, a high incidence of grade 2-3 metaplastic changes and high numbers of lymphocytes were found in temporal interpalpebral conjunctiva of patients when compared to the controls indicating ocular surface inflammation. As a result it was suggested that ocular surface inflammation, apart from evaporative dry eye, plays an important role in the pathogenesis of dry eye in Greaves disease (20)

## Conflict of Interests

The authors declare that they have no conflict of interests regarding the

publication of this paper.

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