

Proportion Of Dry Eye In Hypothyroidism

Sana khan
Consultant Optometrist
Bs (vision sciences) optometry
sanakhann6486@gmail.com
Jahan zeb
Consultant Optometrist
BS Optometry
jahanzbktk@gmail.com
Laraib sindhu
Consultant Optometrist
Bs (Vision sciences) optometry
Laraibsindhu46@gmail.com
Muhammad Arif
Consultant Optometrist
BS optometry
ameerarif55@gmail.com
Muhammad Atiq
Consultant Optometrist
Bsvs(Optometry)
mr.atiq44@gmail.com
Muhammad Tariq
Consultant Optometrist
BS,M Phill optometry
tariqoptometrist@gmail.com

Abstract

Purpose:

The main objective of this study was to determine the effects of hypothyroidism on tear film production.

Research Design and Method:

This was a descriptive cross-sectional study including 63 patients. Tear film production was measured by filter paper strips. The patient's age limit was between 15 to 60 years.

Results:

There were 63 patients in the study. Out of 63 patients 21(33.63%) were males and 42(66.68 %) were females. The percentage of the 20 to 30-year age group was 15 (23.8%), that of the 30 to 38-year age group was 23(27%) and the remaining 31(49.7%) had age 38 to 55 years. A total of 9(14.3%) patients had normal tear film production in the right eye, 13(20.6%) had moderate dryness, and the remaining 31(65.1) had severe dryness. The above table shows tear film production for the left eye. In this 9(14.3%) have normal tear film production time in the left eye, 13(20.6%) have moderate dryness and the remaining 31(65.1%) have severe dryness

Conclusion:

It is concluded that there is a risk of dry eye in hypothyroidism patients because the medicine for hypothyroidism causes dry eye. Therefore most patients with hypothyroidism have severe dryness due to less tear breakup time TBUT.

Date of Submission: 04-05-2023

Date of Acceptance: 14-05-2023

I. INTRODUCTION:

The tear film is a layer that nourishes, lubricates, and protects the interior surface of the eye that's why tears are continuously absorbed and evaporated from the ocular surface to avoid dryness of the eye. The ocular tear film has a complex structure some properties are well known. The tear film is composed of three layers, a Mucin layer which is produced by specialized conjunctival cells and epithelial cells of the eye.¹ Second one is an aqueous layer that is produced by the main lacrimal gland and the last is an outer layer that is composed of polar and non-polar lipids. The intactness of the outer lipid layer stabilizes the tear film and prevents the evaporation of the aqueous layer, so the interior layer of the tear film is the lipid layer which plays a role in stability.²

Thyroid-linked orbitopathy (TAO) is an autoimmune disorder of the eye involving the extraocular muscles and is usually linked with an eye disorder known as Graves's disorder and may hardly be found with hypothyroidism. The clinical features mostly comprise bulging of the eye, problems in the soft tissues of the orbit, restrictive ocular myopathy, lid retraction, inflammatory ocular surface disorders, and optic neuropathy. In dry eyes, short tear film breakup time is the major frequent cause of ocular discomfort in thyroid orbitopathy TAO and is present in 87% of patients.³ The T-cells are responsible for swelling of the eye, augmented tear film osmolarity, and desiccation due to exophthalmos and lid retraction engage in the recreation of a significant function in the outer surface of the eye which causes dryness of the eye. It is also important to know that the lacrimal gland is an intentional part of the thyroid gland which expresses the thyroid receptor β -1 gland. An unending decrease of thyroid gland levels is established to adjust the appearance of the lacrimal gland, thus causing a decrease in tear film production leading to dry eyes due to short tear break-up time. There is a lot of research showing the incidence of dry eyes due to lesser tear breakup time. The thyroid gland is located inside the neck providing two thyroid hormones triiodothyronine T3 and thyroxine T4. The pituitary gland located in the brain controls the function of the thyroid gland by producing thyroid stimulating hormone (TSH) which stimulates the thyroid to produce T3 and T4. Hypothyroidism means deficiency of thyroid hormone also known as underactive thyroid.³ Hypothyroidism mostly occurs in females, it increases with age and it runs in families. The incidence of clinical hypothyroidism is 0.5-1.9% in women, less than 1% in men, and of subclinical 3-13.6% in women and 7-5.7% in men. The normal T3 values are 75-200 ng/DI, TSH 3-5.0 U/ML, and T4 normal values 9-2.8 nmol/L.⁴

Tear breakup time is about 15-45 seconds normally, less than 10 seconds shows a dry eye and is referred to as a deficiency of tears. The failure of tear film function due to hypothyroidism results in foreign body sensation, ocular fatigue, and dryness. Tear film evaporation is increased in lower humidity.⁵ Time in which the tear film returns to its stable position is measured by its tear film breakup time before and after the blink. It is also noted that there is a strong relation between tear spread times which is in direct relation with hypothyroidism. It was concluded that the thickness and timing of tear film depends upon the hypothyroidism.⁶ Normally fully developed range of the thyroid gland is 10 to 20 g in weight and receives blood from two-pronged better and substandard thyroid arteries and a minute artery called the thyroid ima. The two hormones secreted from the thyroid gland i.e. Thyroxine T4 major portion of the secretion of the thyroid making ninety percent of hormone secretions, and the second one is triiodothyronine T3 secretes the remaining ten percent. Tangential tissues renovate Thyroxine T4 to triiodothyronine T3 thus in this way most triiodothyronine is a derivative of Thyroxine. The thyroid gland is matched by the thyroid axis of the hypothalamus-pituitary gland during the course of stimulatory proceedings of TSH and TRH. The Thyroid hormones are high in serum bound to carrier proteins (0.03%-0.04% of T4) and the remaining (0.3%-0.4% of T3) are gratis hormones. The (TBG) thyroid hormone binding globulin is the major carrier, secretarial intended for seventy-five of bound to T4, and others are bound to T3. Thyroxine binds the albumin, albumin is bound with thyroxine and these are responsible for the remaining production of hormones.⁷

Tear osmolarity and tear film break-up time is used to determine the type of dryness mechanism involved in thyroid eye disorder.⁸ All eyes examined except that eye which has high blink rates adequate to prevent dry spot formation. Fourteen (14) out of 33 eyes had abnormally high tear osmolarity.⁹ Deficiency of tear secretion leads to dry eye, dry eyes are easy to diagnose but become difficult to manage in several forms. Many situations are associated with a deficiency of tear secretion such as hypothyroidism.¹⁰ The symptoms of dry eyes are regular discomforts like irritation, grittiness, and itching. Normally the clean corneal epithelium is a relatively hydrophobic surface that is not easily moistened by aqueous solutions such as tears. Therefore by decreasing the tear breakup time, the dryness increased in hypothyroidism.¹²

II. Research Design and Method:

This was a descriptive cross-sectional study that included 63 patients. Tear film production was measured by filter paper strips. Patients involved in the study were above 15 years to 60 years of age groups.

III. Results:

DATA PRESENTATION, ANALYSIS, AND INTERPRETATION

TABLE NO.1

Gender	Frequency	Percent %
Female	42	66.7
Male	21	33.3
Total	63	100.0

TABLE NO.2

Age distribution	Frequency	Percent%
20-29	15	23.8
30-38	17	27.0
39-55	31	49.2
Total	63	100.0

TABLE NO.3

TEAR FILM PRODUCTION IN THE RIGHT EYE.

Range	Frequency	Percent
Normal	9	14.3
moderate	13	20.6
severe	41	65.1
Total	63	100.0

EXPLANATION:

The above table shows tear film production for the right eye. In this 9(14.3%) have normal tear film production in the right eye, 13(20.6%) have moderate dryness and the remaining 31(65.1%) have severe dryness.

TABLE NO.4 TEAR FILM PRODUCTION TIME IN LEFT EYE.

Range	Frequency	Percent
Normal	9	14.3
Moderate	13	20.6
Severe	41	65.1
Total	63	100.0

EXPLANATION:

The above table shows tear film production for the left eye. In this 9(14.3%) have normal tear film production time in the left eye and 13(20.6%) have moderate dryness and remaining 31(65.1%) have severe dryness.

IV. DISCUSSION:

A lot of similar recent research showed the evaluation of the functions of the tear film in hypothyroidism patients. Hypothyroidism patients have less tear film production, less tear film break-up time, and severe dry eyes even in Schirmer test the value is less than 6mm. In addition to that dry eye, disorder is also present in fit subject and dry eyes is extra widespread in patients with energetic hypothyroidism.¹³ there is bulging of the eye due to the enlarged width of the palpebral fissure which may show that the way to visual surface dries and increase the osmolarity of the tear film.¹⁴

So it is concluded that the decrease in tear film break-up time TBUT is the major cause of dry eye in hypothyroidism. Tear breakup time might be due to hyperosmolarity caused due to bulging of eyes.¹⁵ Patients with severe dry eyes and very short tear film break up time TBUT is recommended the serum of thyroxine hormone which is better for the normalization of tear film break up time in hypothyroidism patients. In addition to that artificial tears and modifications of the environment are recommended to these patients.¹⁶ Another similar study proves that in hypothyroidism the TBUT decreases, and due to this the dryness of the eyes increased after the biopsy of conjunctival tissues of the patients of hypothyroidism is seen, mostly patients have orbitopathy and associated with graves' disease.²⁹ Another similar study indicates that the incidence of short tear film breakup time TBUT is observed in ptosis patients with myasthenia gravis which is an autoimmune condition. Therefore

hypothyroidism affects the tear film and reduces tear production leading to short tear film break-up time in hypothyroidism patients.¹⁷

Recent research showed that the myasthenia gravis is a type of orbitopathy in which flav remnants are reserved for the extraocular muscles and cause the defect in tear film production.³¹ In this way the tear breakup time decrease from normal limits and causes dry eye disorder. Hypothyroidism initially affects the eyes causing severe dryness due to a decrease in normal tear breakup time associated with thyroid gland production linked with (TAO) i.e.orbitopathy, though normally observed in a disease known as Graves.¹⁸

V. CONCLUSION

It is concluded that there is a risk of dry eye in hypothyroidism patients because the medicine for hypothyroidism causes dry eye. Therefore most patients with hypothyroidism have severe dryness due to less tear breakup time TBUT.

References

- [1]. Gonzalez-Garcia, M. J., A. Gonzalez-Saiz and B. de laFuente, 2007. Exposure to a controlled adverse environment impairs the ocular surface of subjects with minimally symptomatic dry eyes. 48:4026-4032.
- [2]. Uchiyama, E., J. D. Aronowicz and I. A. Butovich, 2007. Increased evaporation rates in laboratory testing conditions simulating airplane cabin relative humidity; an important factor for dry eye syndrome. 33:174-176.
- [3]. Kostoglou, A. and K. Ntallest, 2009. Hypothyroidism new aspect of an old disease. 45:6701-6712.
- [4]. Emrah, K. and G. Killickan, 2014. Presence of dry eye in patients with hashimotos thyroiditis. 10:1115-1158.
- [5]. David, M. C. and W. L. Mcdermottleonard, 2004. The journal of clinical endocrinology and Metabolism. 89:1-11.
- [6]. David, J., M. B. Stott, R. Nicolas and M. Patricia, 2017. Thyroid hormone therapy or older adults with subclinical hypothyroidism. 376:2534-2544.
- [7]. Mc Cully, J. P., J. D. Aronowicz, E. Uchiyama, W. E. Shine and IA. Butowich, 2006. Correlation in a changes in aqueous tear evaporation with a change in relative humidity and the impact. 141:758-60
- [8]. Isreb, M. A. 2003. Correlation of lipid layer thickness measurements with fluorescein tear film break-up time and Schirmer's test. 17:79-83.
- [9]. Sweeney, D. F., T. J. Millar and S. R. Raju, 2013. Tear film stability. A review. Exp. 117:28-38.
- [10]. Purslow, C., J. S. Wolffsohn and J. Santodomingo-Rubido, 2005. The effect of contact lens wear on dynamic ocular surface temperature. Count. 28:29-36.
- [11]. Anja, K., F. Eckstein, A. Andreas, H. Arnd, 2004. Dry eye syndrome in thyroid-associated ophthalmo-pathy: lacrimal expression of TSH receptor suggests involvement of TSHR- specific autoantibodies. 10:1395-3907.
- [12]. Lemp, M. A., C. Baudoin, J. Baum, 2007. The definition and classification of dry eye disease. 5(2):75-92.
- [13]. Schaumberg, D. A., J. J. Nichols, E. B. Papas, L. Tong, M. Uchino, K. K. Nichols, 2011. The international workshop on meibomian gland dysfunction.52(4).
- [14]. Perry, H. D. and E. D. Donnenfeld, 2004. Dry eye diagnosis and management in 2004.;15(4).
- [15]. Gürdal, C., O. Saraç, I. Genç, H. Kırımhoğlu, T. Takmaz and I. Can, 2011. Ocular surface and dry eye in Graves' disease. 36(1):8-13.
- [16]. Bothun, E. D., R. A. Scheurer, A. R. Harrison and M. S. Lee, 2009. Update on thyroid eye disease and management.3:543-551.
- [17]. Burch, H. B. and L. Wartofsky, 2009. Current concepts regarding pathogenesis and management. 14(6):747-793.
- [18]. Maheshwari, R., and E. Weis, 2012. Thyroid associated orbitopathy.60(2):87-93.