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CLINICAL ASSESSMENT OF OCULAR SURFACE CHANGES IN HYPERTHYROIDISM PATIENTS

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Abstract

Background: *Including eye and vision issues thyroid problems can result in a number of structural body and functional changes, which can be detrimental to a patient's well-being.*

Objective: *To clinically assess ocular surface changes among patients with hyperthyroidism using standardized ocular surface evaluation parameters.*

Methodology: *This study was Cross-Sectional. The research was conducted at The Superior University Lahore from Feb 2023 to May 2023. 46 patients were involved in this study. 15 were female and 31 were male.*

Results: *In this study, the average age was 28.65±4.52 years with an age range (of 18-41 years). Shows the distribution of ocular diagnoses in hyperthyroidism patients. Where 24(52.17%) had conditions of dry eye, 07(15.22%) suffering from corneal abrasion, blepharitis, conjunctivitis, and proptosis each was found in 04(8.70%) of the study subjects, periorbital cellulitis in 02(4.35%) patients, and the corneal ulcer was seen in 01(2.17%)*

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of the study subjects. Ocular surface symptoms were found in hyperthyroidism patients. Among all the most common symptoms was irritation in 11%, itching in the eye in 11%, redness of the eye in 21.76, watery eyes in 11%, and scarring in 11% of subjects. Other symptoms found in patients were blurry vision, cranial nerve problems, lid swelling, pain, paralysed muscle, photophobia, pus, and white eyelash.

Conclusion: *It was noted that peoples with Hyperthyroidism are having Ocular surface problems like corneal abrasion, dry eye conditions, infection, severe pain, conjunctival redness, lid redness, irritation, tearing, and light sensitivity in high frequency. The dry eye test was significant. Diplopia and blepharitis were also present.*

INTRODUCTION

Wide ranges of illnesses that affect the surface of the eyes are referred to as ocular surface disorders. Various ocular surface conditions can cause redness, tears, irritation, sensitivity to light, and intermittent blurred vision. [(1)] Ocular surface pathology also referred to as dry eye, affects the meibomian glands, cornea, conjunctiva, and eyelids. Techniques are used to diagnose dry eye disease. The most corporate tests for this analysis are intrusive and can result in outcomes that are separate from tear's regular properties; therefore, non-invasive approaches would be more suited. [(2)] The etiology of illness characterised by dry eyes, which is characterised as a multifactorial condition affecting the surface of the eye accompanied by ocular symptoms, includes ocular symptoms as well as inflammation and injury tear film to the surface of the eye instability and anomalies, and hyperosmolarity of the neurosensory system. There are three types of dry eye disease: evaporative, aqueous deficient, and mixed. [(3)]

The inner eye surface is nourished, greased, and shielded by a material known as the tear film. Its primary function is to protect against dry eye problems. It has an intricate structure. The specifics of its composition are currently unknown. The mucin is the layers that makes tear film. Aqueous and lipid layers are the following layers. [(4)]

An autoimmune inflammatory disease that affects the eye and surrounding tissues is known as thyroid eye disease. Recently, the absence of thyroid dysfunction and Hashimoto's thyroiditis have been related to thyroid eye disease. Although they are typically asymmetrical, symptoms are frequently bilateral. The most frequent presenting symptoms include eye irritation and dryness, as well as orbital and periorbital oedema, eyelid retraction, eyelid lag in downgaze, restricted strabismus, compressive optic neuropathy, and exposure keratopathy. [(5)]

Conjunctivitis, upper eyelid retraction, and proptosis are typical signs of thyroid eye illness, which is connected to a systemic inflammatory process. These symptoms are in addition to oedema and redness in the periorbital tissues. The aetiology of dry eye disease in these persons may also involve meibomian gland dysfunction, known to be a substantial contributor to an ocular surface issue that results in higher tear film evaporation. [(6)]

Thyroid dysfunction is treated as part of the management for Thyroid Eye Disease since hyperthyroidism in particular is linked to a more severe form of the ailment. [(7)]

There are few studies on dry eye disease in thyroid eye disease patients. Based on subjective symptoms (questionnaires) or objective indicators, it has been recorded in 65 percent to 85 percent of thyroid eye disease patients (Lissamine green staining test, fluorescein, tear break-up time and Schirmer test). [(8)]

In accordance with the clinical activity scores, Graves' ophthalmopathy is divided into active Graves' ophthalmopathy and inactive Graves' ophthalmopathy. Conjunctival redness, chemosis, redness and swelling of the lacrimal

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caruncle, moderate to severe eyelid erythema, moderate to severe eyelid swelling, spontaneous orbital pain, and gaze-evoked orbital pain are all regarded to appear as a single point.[9] Fluorescein should not be used in place of the superior staining agent's lissamine green and rose Bengal for the visualisation of the dry spots on the conjunctiva and cornea. Both of these stains' staining intensity ratings were considerably higher in thyroid orbitopathy -related dry eyes, indicating the presence of drying epithelial cells in both early and late thyroid orbitopathy patients. [10]

Meibomian glands, preventing excessive tear evaporation, secrete the lipid component of tears. Insufficiency of the meibomian glands is thought to be a primary factor in evaporative dry eye. [11] In the detection and treatment of dry eye, new concepts called tear film-oriented diagnostic and therapy tear film-oriented treatment have emerged. Aqueous tears and secretory mucins are among the mucoaqueous-gel and lipid layers that make up the tear film. The membrane-associated mucins and ocular surface epithelium in the glycocalyx layer preserve its stability. This offers a suitable tear film-oriented treatment for dry eyes. [12]

MATERIAL AND METHODS

A cross-Sectional Study was performed from February 2023 to May 2023, at Superior University, Lahore. The sample size was 46. The study included Patients having Hyperthyroidism with ocular surface problems. The age range of the patients is 15 to 45. Both gender (Male, Female) was included. Patients with age below 15 and more than 45. Patients who might be reticent participants. Patients with any other disease and patients who do not want to participate were not eligible for the study. A Self Designed Proforma was used for data collection. Data from 46 patients was collected, by attending the Endocrinology/Clinical Cases ward of Hospital. Who satisfied inclusion criteria. After taking consent and filling out the proforma. The ocular surface of Hyperthyroidism's patients was examined by slit lamp; Tear break up time were known by Fluorescein Strips and Schirmer Strips were used to know tear production and a stop watch was used to know time interval. To find the level of Hyperthyroidism some laboratory test Thyroid function test was performed. Data was entered and analyzed in SPSS vs 26. Quantitative variables are presented as mean± standard deviation and qualitative variables are presented as frequency and percentages. Chi-square was applied to compare the severity of clinical tests. A P-value <0.05 is considered significant.

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RESULTS

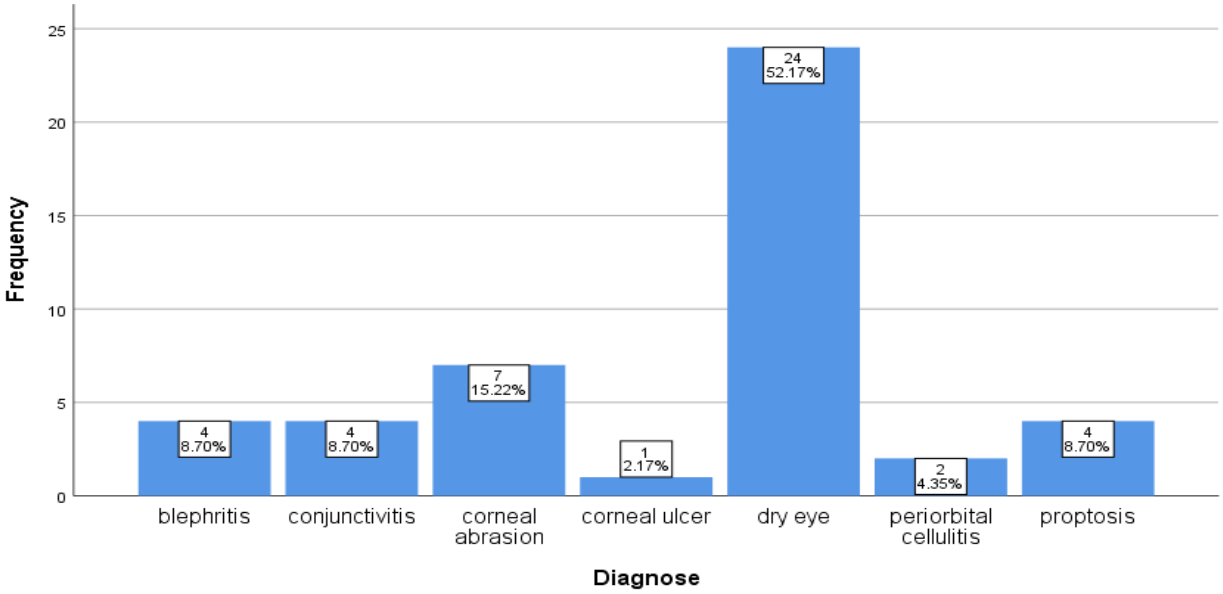

Figure No. 1: Distribution of Ocular Diagnoses in Hyperthyroidism Patients

In this study, the average age was 28.65±4.52 years with an age range (of 18-41 years). Figure no. 1 shows the distribution of ocular diagnoses in hyperthyroidism patients. Where 24(52.17%) had conditions of dry eye, 07(15.22%) suffering from corneal abrasion, blepharitis, conjunctivitis, and proptosis each was found in 04(8.70%) of the study subjects, periorbital cellulitis in 02(4.35%) patients, and the corneal ulcer was seen in 01(2.17%) of the study subjects.

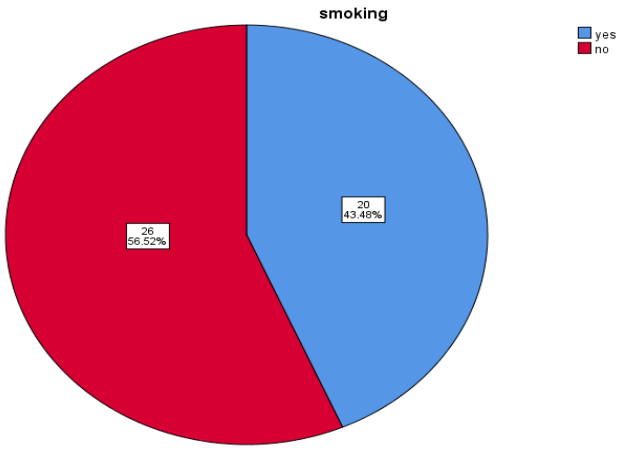

Figure No. 2: Distribution of Smoking Habits Among Hyperthyroidism Patients

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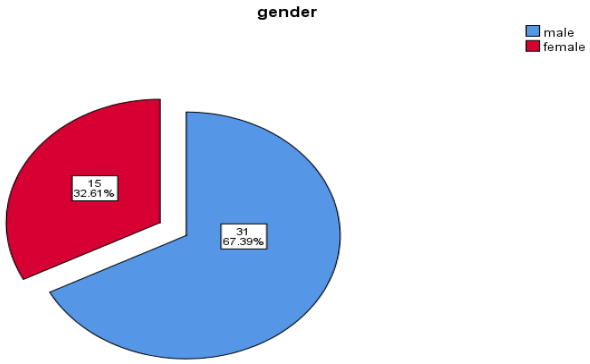

Figure No. 3: Gender Distribution of Hyperthyroidism

Table No.1: Ocular and dry eye symptoms in Hyperthyroidism

Symptoms	No of patients	Percentage
Blurry Vision	1	2.2
Cranial nerve/ muscle	1	2.2
Irritation	5	11.0
Itching	5	11.0
Lid swelling	1	2.2
Pain	3	6.5
Paralysed Muscle	3	6.5
Photophobia	1	2.2
Pus	2	4.3
Red eye	10	21.74
Scar	5	11.0
Swelling	3	6.5
Watery eye	5	11.0
White Eye Lashes	1	2.2
Total	46	100.0

Ocular surface symptoms were found in hyperthyroidism patients. Among all the most common symptoms was irritation in 11%, itching in the eye in 11%, redness of the eye in 21.76, watery eyes in 11%, and scarring in 11% of subjects. Other symptoms found in patients were blurry vision, cranial nerve problems, lid swelling, pain, paralysed muscle, photophobia, pus, and white eyelash. (Table 1)

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Table No. 2: Central Vision in Hyperthyroidism

	Frequency	Percentage
SC	17	37.0
CC	29	63.0
Total	46	100.0

According to the table above, hyperthyroidism patients screened for vision and without correction was found in 17(37%) of patients and vision with correction in 29(63%) of patients.

Table No. 3: Inflammation/ Congestion Subjectively in Hyperthyroidism

	Yes		No	
	Frequency	Percentage	Frequency	Percentage
At rest	14	30.4	32	69.6
With Gaze	18	39.1	28	60.9
Lid Swelling	14	30.4	32	69.6
Progress (Moderate-Medium)	46(100%)			

In above table 3, inflammation/congestion in hyperthyroidism patients with related symptoms is shown.

Table No. 4: Ocular Surface Symptoms Objectively in Hyperthyroidism

	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Conjunctival Redness	20	43.5	26	56.5
Lid Redness	17	37	29	63
Lid Edema Upper	03	6.5	43	93.5
Lid Edema Lower	03	6.5	43	93.5

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In Table 4, a few more ocular symptoms are shown. The most common symptom was conjunctival redness in 17(43.5%) of hyperthyroidism patients.

Table No. 5: Appearance/Exposure Subjectively of Ocular Surface in Hyperthyroidism

	Yes f (%)	No f (%)
Lid Stare	04(8.7)	42(91.3)
Light Sensitivity	41(89.1)	05(10.9)
Bulging Eyes	04(8.7)	42(91.3)
Tearing	28(60.9)	18(39.1)
Ocular Irritation	35(76.1)	11(23.9)
Red Eyes	46(100)	

In above table 5, exposure to multiple eye-related symptoms is shown. The most common problem was light sensitivity in 41(89.1%) of the subjects, and redness was seen in each patient.

Table No. 6: Ocular Problems Objectively in Hyperthyroidism

	OD		OS	
	Yes f (%)	No f (%)	Yes f (%)	No f (%)
Exophthalmos		46(100)		46(100)
Corneal Erosions	07(15.2)	39(84.8)	07(15.2)	39(84.8)
Blurry Vision	40(87)	06(13.0)	40(87)	06(13.0)
Severe Pain	36(78.3)	10(21.7)	39(84.8)	07(15.2)
Infection	15(32.6)	31(67.4)	15(32.6)	31(67.4)
Pink Eye		46(100)		46(100)

In Table 6, the most common problem in both eyes was blurry vision in 40(87%) of patients. The second most common issue was severe pain in the right eye in 36(78.3%) of patients and in the left eye in 39(84.8%) patients.

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Table No. 7: Inflammatory Index in Hyperthyroidism

	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Diplopia	3	6.5	43	93.5
High Tear Production	4	8.7	42	91.3
Pus	5	10.9	41	89.1
Weight Loss	2	4.3	44	95.7

In Table 7, there was no problem most common among hyperthyroidism. It was seen diplopia in 03(6.5%) of patients, high tear production in 04(8.7%), pus in 05(10.9%), and weight loss in 02(4.3%) of patients.

Table No. 8: Clinical Tests

	Mild	Moderate	Severe	P-value
	F (%)	F (%)	F (%)	
Fluorescent	41(89.1)	01(2.2)	04(8.7)	<0.001*
Schirmer	35(76.1)	07(15.2)	04(8.7)	<0.001*
TFT Level			46(100)	<0.001*

*indicates significant p-values, the chi-square test was applied

In Table 8, the severity level of clinical symptoms is shown, it was seen while performing fluorescent the mild symptoms in 41(89.1%) patients and severe in 04(8.7%) patients. In the Schirmer test mild problems in 35(76.1%) patients, moderate in 07(15.2%), and severe in 04(8.7%) of patients. Severe TFT level was seen in all 46 subjects. All the clinical tests have statistically significant effect.

DISCUSSION

It is widely known that thyroid disease can affect the eyes. This study's goal was to ass the surface of the eyes problems in the case of hyperthyroidism. The present study investigated 46 subjects of Hyperthyroidism. The average age was 28.65±4.52 years with an age range (of 18-41 years). In this study 15(32.61%) were female participants, and 31(67.39%) were male participants. Most studies have more female-to-male ratio [4], but in our study, the case is the opposite we have more males than females, and some other studies have compatibility with the current study. [13, 14]

In ocular diagnoses, 24(52.17%) had conditions of dry eye, a research was conducted to ascertain the impact of hyperthyroidism on tear film production, and it was determined that people with hyperthyroidism are at risk for dry eyes. Dry eyes result from hyperthyroidism medication. Because tears don't break up as quickly, hyperthyroidism patients typically have severe dryness, it was found in 83.3% of cases in a study.[13] 07(15.22%) suffering from corneal abrasion, blepharitis 04(8.70%), conjunctivitis 04(8.70%), and proptosis was found in 04(8.70%) of the study subjects, periorbital cellulitis in 02(4.35%) patients, and the corneal

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ulcer was seen in 01(2.17%) of the study subjects. Elwan et al. conducted a study to investigate the advantages of conjunctival impression cytology to detect ocular surface changes in patients with thyroid disorders. His findings demonstrated that patients with abnormal thyroid function experienced an increased frequency of dry eyes than normal people.[15] In the present study comparison was not made with normal people.

Ocular surface symptoms were seen in hyperthyroidism patients, the most common symptoms were irritation in 05(11%), itching in the eye in 05(11%), redness of the eye in 10(21.76%), watery eyes in 05(11%), and scarring in 05(11%) of subjects. Other symptoms found in patients were blurry vision 01(2.2%), cranial nerve problems 01(2.2%), lid swelling 01(2.2%), pain 03(6.5%), paralysed muscle 03(6.5%), photophobia 01(2.2%), pus 02(4.3%), and white eyelash in 01(2.2%).

The hyperthyroidism patients screened for vision loss and without correction were found in 17(37%) of patients and vision with correction in 29(63%) of patients. In this study, 6/6 vision was in 24(52.2%) both in the left and right eyes 20(43.5%) of subjects, 6/9 vision in the right eye in 05(10.9%), and the left eye was 10(21.7%) of patients, 6/12 in the right eye in 04(8.7%) and in the left eye 04(8.7%) of study subjects. Refractive Inflammation/congestion was seen, and lid swelling was found in 14(30.4%) of patients. Refractive error and loss of vision or decreased vision are the major common issues in hyperthyroidism patients. In 2018, a retrospective study was conducted to investigate eye disorders in hyperthyroidism patients. They also investigated that decreased vision and refractive errors were the basic signs.[14]

Conjunctival redness in 20(43.5%), lid redness in 17(3.7%), lid edema in upper lid 03(6.5%), and lower lid edema in 03(6.5%) was seen. Exposure of ocular surface problems in hyperthyroidism was observed, these problems were investigated lid stare in 04(8.7%), light sensitivity in 41(89.1%), bulging eyes in 04(8.7%), tearing in 28(60.9%), ocular irritation in 35(76.1%) of study subjects. Recently, it was believed that mechanical factors were the failure of the visual surface function. Notably, increased exposed area and ocular surface impairment were thought to be caused by eye globe bulging and the upper eyelid retraction with a subsequent increase in eyelid fissure width.[16]

The most common ocular problem in both eyes was blurry vision in 40(87%) of patients. The second most common issue was severe pain in the right eye in 36(78.3%) of patients and the left eye in 39(84.8%) patients, corneal erosions were observed inside the right eye in 07(15.2%), infection in the right eye in 15(32.6%), corneal erosion in the left eye in 07(15.2%), and infection in the left eye in 15(32.6%) of study participants. Patients with thyroid conditions experience exophthalmos, which affects the eye's soft tissues and causes their expansion. [17] In the current study, the effect of exophthalmos did not find in any patient. Lagophthalmos, a condition that prevents someone from completely closing his or her eyelids, results from exophthalmos. As a result, the ocular surface is disturbed, and the rate of tear evaporation and hyperosmolarity has been increased.[18]

Diplopia was seen in 03(6.5%) of patients, high tear production in 04(8.7%), pus in 05(10.9%), and weight loss in 02(4.3%) of patients of hyperthyroidism. The severity level of clinical symptoms is shown, it was seen while performing fluorescent the mild symptoms in 41(89.1%) patients and severe in 04(8.7%) patients. In the Schirmer test mild problems in 35(76.1%) patients, moderate in 07(15.2%), and severe in 04(8.7%) of patients. Severe thyroid function test level was seen in all 46 subjects. The clinical investigations were statistically significant i.e. fluorescent test p=<0.001, Schirmer test p=<0.001, and thyroid function test level p=<0.001. The findings showed that patients with thyroid disorders had a significant level of dry eyes. A study's findings are similar to this study. [17] In another study, conducted by Ekin et al., which evaluated the ocular surface changes in patients with thyroiditis, clinical examinations like the Schirmer test, and fluorescent test also found significant results.[19]

CONCLUSION

It was noted that peoples with Hyperthyroidism are having Ocular surface problems like corneal abrasion, dry eye conditions, infection, severe pain, conjunctival redness, lid redness, irritation, tearing, and light sensitivity in high frequency. The dry eye test was significant. Diplopia and blepharitis were also present.

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