

Dry Eye Disorder in Adult Patients Having Hyperthyroidism

Dry Eye with
Hyperthyroidism

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ABSTRACT

Objective: The aim of this study was to note the frequency of dry eye disorder in adult patients having hyperthyroidism.

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Ophthalmology of Bahawal Victoria Hospital, Quaid-e-Azam Medical College, Bahawalpur from March 2016 to September 2016.

Materials and Methods: A total of 60 patients, aged 18 to 60 years, with hyperthyroidism were enrolled in this study. Fluorescein strips along with slit lamp and pen torch were used for the evaluation of dry eye disorder. The dry eye was further graded according to the severity level 1, 2, 3 and 4 with help of history, clinical findings and schirmer test.

Results: Amongst a total of 60 patients, 22 (36.7%) were male and 38 (63.3%) female. Overall mean age was noted to be 39.53 years with a standard deviation of 6.9 years and most of the patients, 28 (46.7%) were between 36-50 years. Overall out of 60 patients, dry eye disorder was found to be in 50 (83.3%) cases. When patients having dry eye disorder were compared with normal eyes, except duration of hyperthyroidism as more than 10 years (p value = 0.021), no significant difference was found with regards to gender (p value = 0.632), age (p value = 0.459), area of residence (p value = 0.624) or history of smoking (p value = 0.275).

Conclusion: Frequency of dry eye disorder in adult patients having hyperthyroidism was noted as high. Duration of hyperthyroidism seemed to promote dry eye disorder.

Key Words: Hyperthyroidism, tear break-up time, dry eye, schirmer test.

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INTRODUCTION

Tear film is known to be a layer that is responsible for nourishment, lubrications and protection of eye's external surface. One of the basic functions related to tear film is that it plays an important role in avoidance of dry eye symptoms.¹ Complete structure of ocular tear film is not fully understood and is described as complex. Tear film is formed of 3 layers. Mucin layer that is formed by specialized conjunctival and epithelial cells, and is connected with the corneal epithelium.² An aqueous layer that is formed by the main lacrimal gland and its accessories while its outer layer is formed of polar and non polar lipids derived from meibomian glands. The intact outer lipid layer stabilizes the tear film and avoids the aqueous layer to evaporate.

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Tear film's last outer layer is a lipid layer that is imperative for the stability. Time taken by tear film to get back to stability is gauged by the break-up of tear film right before and after the blink.³

Thyroid eye disease (TED) is known to be an autoimmune disorder that poses an important clinical as well as therapeutic challenge.⁵ TED has been estimated to occur in about half of the individuals having Graves disease.⁶ TED has also been observed with or without the presence of hyperthyroidism.⁷ Solid association between tear spread time and hyperthyroidism have been discussed in the past.⁸ It has been observed that thickness and timing related to tear film is dependent upon hyperthyroidism.⁹ Thyroid gland weighs about 10-20g when developed fully while thyroid arteries and a tiny artery known as thyroid ima are responsible for its blood supply.⁸ Thyroxine as T4 forms the major chunk of thyroid secretions as hormones from thyroid glands whereas other important hormone released by thyroid gland is T3. The thyroid gland is modulated with the assistance of thyroid axis of hypothalamus pituitary gland. Thyroid hormone binding globulin (TBG) is the main carrier for T4 and T3 while pre albumin and albumin are known to be attached with thyroxine.¹⁰

Hyperthyroidism is a condition where thyroid gland is producing too much thyroxine while it can fasten metabolism that is found to manifest weight loss as well as raising heartbeat, and causing anxiety and

sweating.¹¹ Clinical hyperthyroidism has been estimated to have an incidence of 0.5 to 2% amongst female while 1% amongst male. Subclinical hyperthyroidism has been accounted to affect about 3 to 14% of females while its prevalence in male has been noted as around 7%. Hyperthyroidism has been noted to occur more in female gender, increasing age as well as positive family history has also been labeled to be associated with it. The normal value of T3 is taken as 75 to 200 ng/dl while TSH 3 to 5.0 U/ml and T4 as 0.9 to 2.8 ng/dl.^{8,12} Patients with systemic disorders are commonly found to have dry eye while ocular changes along with symptoms like irritation, pain and burning sensations are frequent in these patients.¹³ Disorders related to thyroid glands have been recognized to affect normal eye functions. Hyperthyroidism has been found to affect eyes and by decreasing normal tear break-up time (TBUT), it is thought to contribute to dryness of eye. Manufacturing of thyroxine is related to thyroid associated orbitopathy (TAO) which is usually depicted in Graves Thyrotoxicosis. Hyperthyroidism is detected quite early along with sign and symptoms related to graves disease.¹⁴ Not much work has been done to note the magnitude of dry eye disorder in patients suffering with hyperthyroidism while no work exist in our local population so this study was aimed to note the frequency of dry eye disorder in adult patients having hyperthyroidism.

MATERIALS AND METHODS

A total of 60 patients, aged 18 to 60 years, with hyperthyroidism were enrolled in this cross-sectional study, done at Department of Ophthalmology of Bahawal Victoria Hospital, Quaid e Azam Medical College, from March 2016 to September 2016. Patients having any autoimmune disease or other associated systemic or chronic disease were excluded from the current study.

Informed consent was taken from all the patients while approval from institutional Ethical and Research Committee was also sought. Fluorescein strips along with slit lamp and pen torch were used for the evaluation of dry eye disorder. Tear film break up time (TFBUT) was recorded in all the study participants. TFBUT is the interval between the last blink and the appearance of the 1st randomly distributed dry spot. TBUT of less than 10 seconds was taken as abnormal. The dry eye was further graded according to the level 1, 2, 3 and 4 with help of history, clinical findings and schirmer test.⁸

Demographic information like age, gender, area of residence, history of smoking, duration of hyperthyroidism and presence of dry eye were recorded on a predesigned proforma. Mean and standard deviation were calculated for quantitative variables like age and duration of hyperthyroidism while frequencies and percentages were calculated for qualitative

variables like gender, history of smoking and presence of dry eye disorder. Independent sample t test was applied to compare the means while chi square test was applied to qualitative variables considering p value as less than or equal to 0.05 as significant.

RESULTS

Amongst a total of 60 patients, 22 (36.7%) were male and 38 (63.3%) female. The male to female ratio turned out to be 1:1.72. There were 14 (23.3%) patients between 18-35 years, 28 (46.7%) between 36-50 years and 18 (30.0%) between 51-60 years. Overall mean age was noted to be 39.53 years with a standard deviation of 6.9 years. There were 40 (80.0%) patients who belonged to rural areas while remaining 20 (40.0%) were from urban areas.

Overall out of 60 patients, dry eye disorder was found to be in 50 (83.3%) cases (Figure No.1). In terms of right eye, 10 (16.7%) patients were found to have normal eye while 8 (13.3%) were having dry eye severity level 1, 25 (41.7%) had dry eye severity level 2, 13 (21.7%) dry eye severity level 3 and 4 (6.7%) had dry eye severity level 4. Similar findings were noted in the left eye as well (Table No.1).

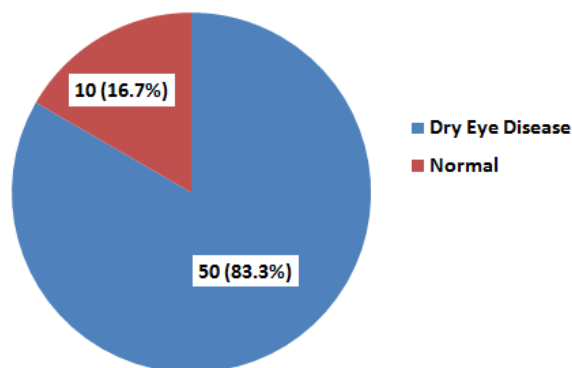


Figure No.1: Distribution of Dry Eye Disorder Amongst Patients with Hyperthyroidism (n=60)

Table No.1: Severity of Dry Eye Amongst the Study Cases

Dry Eye Severity	Right Eye (n=60)	Left Eye (n=60)
Normal	10 (16.7%)	10 (16.7%)
Severity Level 1	8 (13.3%)	8 (13.3%)
Severity Level 2	25 (41.7%)	25 (41.7%)
Severity Level 3	13 (21.7%)	13 (21.7%)
Severity Level 4	4 (6.7%)	4 (6.7%)

When patients having dry eye disorder were compared with normal eyes, no significant difference was found with regards to gender (p value = 0.632), age (p value = 0.459), area of residence (p value = 0.624) or history of smoking (p value = 0.275) but duration of hyperthyroidism as more than or equal to 10 years was turned out to be a significant factor (p value = 0.021) as

30 (60.0%) of the cases with more than 10 years of disease duration of hyperthyroidism were having dry eyes in comparison to only 2 (20.0%) with normal eyes (Table No.2).

Table No.2: Relation of Dry Eye Disorder with study variables Amongst Study Cases

Study Variable	Normal (n=10)	Dry Eye Disorder (n=50)	P Value
Gender			
Male	3 (30.0%)	19 (38.0%)	0.632
Female	7 (70.0%)	31 (62.0%)	
Age (Mean \pm SD)	38.07 \pm 7.4	39.85 \pm 6.8	0.459
Area of Residence			
Urban	4 (40.0%)	16 (32.0%)	0.624
Rural	6 (60.0%)	34 (68.0%)	
History of Smoking			
Yes	1 (10.0%)	13 (26.0%)	0.275
No	9 (90.0%)	37 (74.0%)	
Duration of Hyperthyroidism			
≥ 10 years	2 (20.0%)	30 (60.0%)	0.021
< 10 years	8 (80.0%)	20 (40.0%)	

DISCUSSION

Compromised functions related to tear film amongst patients of hyperthyroidism has been a topic of interest in the recent years. It has also been noted that patients having hyperthyroidism are found to possess less TBUT.¹⁵ Schirmer value < 6 mm along with dry eye disorder has been found to be commonly prevalent in patients with hyperthyroidism.¹⁶ Bulging of eyes is another harmful characteristic along with enlarged width of palpebral fissure that has been found to result in evaporation of the tear film and contributes to osmolarity increase of tear film. Decrease in TBUT is thought to be because of hyperosmolarity due to bulging of the eyes.¹⁷ In individuals with hyperthyroidism who have less TBUP and found with severe dry eye disorder, thyroxine hormone has been found to have better effects seeking normalization of TBUT.¹⁸ In such patients, artificial tears and environmental modifications are endorsed by researchers around the world.¹⁹

In the current study, 22 (36.7%) patients were male and 38 (63.3%) female. The male to female ratio turned out to be 1:1.72. There were 14 (23.3%) patients between 18-35 years, 28 (46.7%) between 36-50 years and 18 (30.0%) between 51-60 years. Our findings were pretty consistent to what previous literature has established as hyperthyroidism is found to occur more in female gender and increasing age have also been labeled to be associated with it.^{8,12}

In the present study, we noted that overall, 42 (70.0%) patients were having moderate to severely decreased

TBUT. In 2018, Zubair M et al from Department of Ophthalmology, The University of Lahore Teaching Hospital, Lahore⁸ noted similar results where they found that majority of the patients with hyperthyroidism were suffering with severely decreased TBUT.

It has been studied in the past that in patients having hyperthyroidism, decrease in TBUT contributes and increases to dryness of eyes. In patients having hyperthyroidism, conjunctival tissues biopsy have been found to prove that majority of the individuals were having orbitopathy.²⁰ A study assessing the tear film dynamics, done by Tomlinson A et al, found that decrease in TBUT was noted in ptosis patients having myasthenia graves which means that the dry eye in those patients having hyperthyroidism does not result only because of bulging of eyes.²¹

Cigarette smoking has been found associated with dry eye disorder.^{22,23} We could not note any significant association of history of smoking with dry eye disorder which may be attributed to overall small sample size and less number of males in the present work. In the current study, duration of hyperthyroidism as more than or equal to 10 years was turned out to be a significant factor (p value = 0.021) as 30 (60.0%) of the cases with more than 10 years of disease duration of hyperthyroidism were having dry eyes in comparison to only 2 (20.0%) with normal eyes. TED has been observed with the presence of hyperthyroidism.⁷ Solid association between tear spread time and hyperthyroidism have been discussed in the past and more the duration of hyperthyroidism, further it may impact the overall functions of the eyes.⁸

In Pakistan, not much work has been done to estimate the numbers affected with thyroid eye disorders but in UK,²⁴ it was estimated that around 400,000 persons have eye disorders related to thyroid function abnormalities. David MC and colleagues²⁵ noted that thyroid eye disorder related to Graves disorder with lesser TBUT and expressed thyroid eye disorder as an enormously horrible and disturbing state. In light of the results of this study, more studies having bigger sample size involving multiple population sets should be planned to estimate the number of patients with hyperthyroidism and suffering with dry eye disorder.

CONCLUSION

Frequency of dry eye disorder in adult patients having hyperthyroidism was noted as high. Duration of hyperthyroidism seemed to promote dry eye disorder. Special attention should be given to those patients who present with dry eye disorder having hyperthyroidism.

Author's Contribution:

Concept & Design of Study: Nadia Nazir
 Drafting: Zulfiqar Ali
 Data Analysis: Ejaz Latif

Revisiting Critically: Nadia Nazir, Zulfiqar Ali
 Final Approval of version: Nadia Nazir

Conflict of Interest: The study has no conflict of interest to declare by any author.

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