



Research Article:

The Relationship Between Eye Diseases and Toxic Thyroid Gland: A Concentrated Study

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Abstract

Background: When the thyroid gland becomes overactive or underactive, a variety of health issues may occur, including eye illnesses. Thyroxine (T4) and triiodothyronine (T3) are the two primary hormones produced by the thyroid gland. These hormones are essential for maintaining of proper eye function. When the thyroid gland is hyperactive, it can cause a variety of eye disorders for example Graves' ophthalmopathy. **Aim:** To explore the potential link between eye disorders and toxic thyroid glands, specifically how hyperthyroidism (an overactive thyroid gland) may contribute to the development of eye conditions like Graves' ophthalmopathy. . The ultimate goal is to enhance patient outcomes through better knowledge and management of these complicated illnesses. **Patients and Methods:** The second survey questionnaire was completed by 100 patients with thyroid disorders. Several approaches are available to assess the link between ocular problems and toxic thyroid glands. Among these methods are Thyroid Function Tests and a Comprehensive Eye Exam: Thyroid function tests include measuring the plasma levels of TSH, T3, and T4 levels to see if there is an underlying thyroid gland dysfunction which may produce abnormalities in the eyes. **Results:** The study included 100 patients, with 81% of them being women. Individual ocular problems are more common in male than in female patients. Exophthalmos was reported by about 70% of the men (the most frequently). Patients also frequently reported redness of the eyes (68%), edema or swelling of the eyelids (67%), and ocular dryness (61%). They were less likely to have a hazy vision, but about one-third did. **Conclusion:** Hyperthyroidism and Graves' disease can lead to eye problems such as bulging eyes, double vision, dry eyes, and sensitivity to light. It is important to have regular eye exams and seek medical attention if any changes occur.

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1. Introduction

The thyroid gland is an important endocrine gland that regulates the body's metabolism. It generates hormones that regulate numerous bodily activities such as heart rate, body temperature, and energy levels. When the thyroid gland becomes overactive or underactive, it can cause a variety of health issues, including eye illnesses (1).

Numerous investigations have been conducted throughout the years to investigate the link between ocular problems and toxic thyroid glands. Thyroxine (T4) and triiodothyronine (T3) are the two primary hormones

produced by the thyroid gland. These hormones are essential for maintaining proper eye function. When the thyroid gland becomes hyperactive or underactive, it can cause a variety of eye disorders (2). When the thyroid gland becomes hyperactive or underactive, it can cause a variety of eye disorders, including (3):

1. Graves' ophthalmopathy: A disorder in which the immune system assaults the tissues surrounding the eyes, resulting in inflammation and edema. It can cause eye swelling, blurred vision, and pain (4).

2. Dry eyes: That can be caused by hyperthyroidism and hypothyroidism, causing discomfort, irritation, and even visual issues (5).

3. Eye muscle weakness: Hyperthyroidism can induce weakening in the muscles that govern eye movement, resulting in double vision or difficulties focusing (6).

4. Eyelid retraction: Hyperthyroidism may lead the upper eyelids to retract or pull back, giving the eyes a bigger appearance than usual (7).

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5. Optic neuropathy: An overactive thyroid gland can produce pressure on the optic nerve, resulting in a visual loss in rare circumstances (8).

Individuals suffering from thyroid issues should undergo frequent eye exams and report any changes in their vision or eye health to their healthcare physician (9).

Several types of studies have been conducted to evaluate the link between toxic thyroid glands and ocular problems. According to one study published in the Journal of Ophthalmology, patients with Graves' disease (an autoimmune condition that causes hyperthyroidism) had a higher prevalence of eye problems than those who did not have Graves' disease (10). The study also discovered that patients with Graves' disease were more likely to acquire severe eye disorders. Graves' ophthalmopathy is a disorder that affects up to 50% of Graves' disease patients. It happens when the immune system targets the muscles and tissues around the eyes, causing them to swell and become inflamed. This can result in a variety of eye disorders, including (11): exophthalmos, or bulging eyes, double vision, dry eyes, eye pain, and vision loss.

People with severe Graves' disease or those who have had the ailment for a long time are more likely to acquire these eye problems. In addition, women are more likely than men to develop Graves' ophthalmopathy (12).

Graves' ophthalmopathy is often treated with eye drops or artificial tears to alleviate symptoms. Surgery may be required in some cases to rectify bulging eyes or relieve pressure on the optic nerve. Finally, patients with Graves' illness should be aware of the increased risk of developing serious eye conditions including Graves' ophthalmopathy. Regular eye exams and early treatment can aid in the management of symptoms and the prevention of visual loss (13).

Another study discovered that hyperthyroid patients had a higher prevalence of dry eyes than those who did not have hyperthyroidism. The study also discovered that people with hyperthyroidism were more likely to acquire corneal ulcers. Corneal ulcers are open lesions on the cornea, the eye's transparent outer layer (14). They can be caused by several circumstances, such as infection, damage, or underlying medical disorders. Corneal ulcers are characterized by eye discomfort, redness, and light sensitivity (15). According to research, people with hyperthyroidism are more likely to develop corneal ulcers than those who do not have the illness. This is likely to be due to a combination of hyperthyroidism-related factors, as follows (16):

To begin with, hyperthyroidism can cause dry eyes by increasing tear evaporation while decreasing tear production. Dry eyes can cause corneal damage and increase the chance of getting ulcers (17).

Second, hyperthyroidism can impair the immune system, making it harder for the body to fight infections. This raises the possibility of getting bacterial or viral infections, which can lead to corneal ulcers, more than in people who do not have the illness (18).

Finally, several drugs used to treat hyperthyroidism can increase the chance of developing corneal ulcers. Corticosteroids, for example, might decrease the immune system and increase susceptibility to infections when administered to treat Graves' disease. Finally, patients with

hyperthyroidism should be informed of their increased risk of developing corneal ulcers. Regular eye exams and good management of their thyroid condition are critical steps in preventing this potentially catastrophic consequence (19).

A third study published in Thyroid Research discovered that people with hypothyroidism (an underactive thyroid gland) had a higher prevalence of cataracts than those who did not have hypothyroidism. The study also discovered that patients with hypothyroidism were more likely to acquire glaucoma. Glaucoma is a set of eye illnesses that cause optic nerve damage and can result in vision loss or blindness. Although there are various types of glaucoma, it is frequently associated with increased eye pressure. Glaucoma is a dangerous ailment that necessitates immediate treatment to avoid permanent vision loss (20).

2. Experimental section

2.1 Patients and methods

The second survey questionnaire was completed by 100 patients with thyroid disorders (Graves' disorder and thyrotoxicosis). Several approaches are available to assess the link between ocular problems and toxic thyroid glands. Among these methods are:

A. Complete Eye Exam: A complete eye exam is an important tool for determining eye health, for example, exophthalmos, or redness of the eyes, and blurred vision. This examination can aid in the detection of any abnormalities in the eyes caused by thyroid gland disease. An ophthalmologist performs an eye exam to confirm the presence of eye disorders caused by thyroid gland disease.

B. Thyroid Function Tests: These tests assess TSH, T3, and T4 levels to detect if an underlying thyroid gland dysfunction is producing abnormalities in the eyes.

2.2 Statistical analyses

Statistical analysis was performed using IBM SPSS Statistics for Windows, version 29 (Armonk, NY, USA). Descriptive statistics are presented in percentages and figures done by graph prism.

3. Results

The study involved 100 patients, 81% of whom were women. Clinical data are provided in **Table 1** and **Figure 1** the majority between 30 and 40 years as shown in **Figure 2**.

Figure 1 shows the prevalence of individual ocular complaints in male and female patients. Nearly 70% of the men reported exophthalmos most often. The patients also frequently reported the occurrence of redness of the eyes (68%), edema or swelling of eyelids (67%), and eye dryness (61%). However, they were less likely to experience blurred vision, but still, nearly one-third did, as shown in **Table 1**.

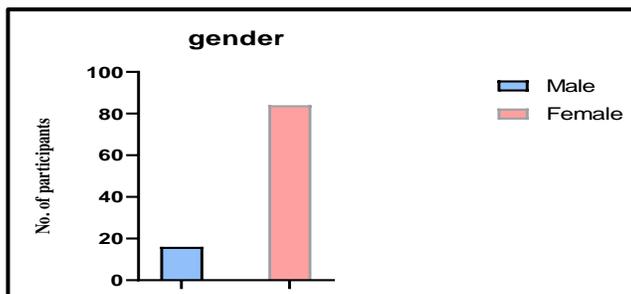


Figure 1. Gender distribution

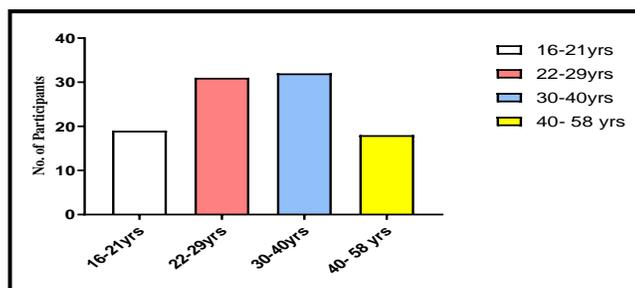


Figure 2. Patients' age distribution

Table 1. Parameters the questions and their percentage

Parameter		Frequency	Percent
Gender	Male	16	19%
	Female	84	81%
Does he have an eye problem before he develops thyroid disease?	Yes	95	95%
	No	5	5%
Exophthalmos	Yes	70	70%
	No	30	30%
Redness of eyes	Yes	68	68%
	No	32	32%
Edema or swelling of eyelids	Yes	67	67%
	No	33	33%
Blurred vision	Yes	35	35%
	No	65	65%
Eye dryness	Yes	61	61%
	No	39	39%

4. Discussions

The thyroid gland, which is located in the neck, is an important endocrine gland that produces hormones that regulate metabolism and other bodily functions. When the thyroid gland produces too much or too little hormone, it can lead to several health concerns, including vision impairments. Thyroid eye disease (TED) is another eye illness linked to a toxic thyroid gland. People with

hyperthyroidism, or an overactive thyroid gland, are at risk for TED (21). It causes swelling and inflammation in the muscles and tissues surrounding the eyes, resulting in bulging eyes, double vision, and other symptoms (22). A toxic thyroid gland can induce additional eye disorders in addition to Graves' ophthalmopathy and TED: dry eyes (14), corneal ulceration (15), and optic neuropathy (23).

These problems are normally treated by addressing the underlying thyroid disease as well as any ocular symptoms that may be present. If you have any eye problems or indications of a toxic thyroid gland, you must seek medical assistance immediately. In the current investigation, various eye symptoms were observed in toxic thyroid patients, including exophthalmos (70%) which is a high percentage. This finding is consistent with the findings of Lanzolla, G., et al 2023, who discovered that the exact percentage of patients with exophthalmos varies depending on the population investigated and the severity of their thyroid toxicity (24). Exophthalmos, or eye bulging, is a typical symptom of toxic thyroid disorders such as Graves' disease. The precise etiology of exophthalmos in these people is unknown, although it is thought to be an immunological reaction that produces inflammation and swelling of the tissues behind the eyes. Many ocular symptoms seen in toxic thyroid patients are included in the current investigation which includes exophthalmos, redness of eyes, edema or swelling of eyelids, blurred vision and eye dryness. The immune system creates antibodies that stimulate the thyroid gland to produce excess thyroid hormones in Graves' illness. These hormones can result in a variety of symptoms including inflammation and swelling of the tissues behind the eyes. This inflammation can produce an increase in pressure within the eye socket, causing the eyeball to move forward and bulge outward. This can cause a variety of symptoms such as double vision, dry eyes, and trouble closing the eyelids (25).

This could result in eye redness and swelling of the eyelids (22). Other Graves' ophthalmopathy symptoms include double vision, sensitivity to light, eye dryness or irritation, and trouble moving the eyes. Treatment for Graves' ophthalmopathy may involve thyroid hormone management drugs or surgery to remove a portion of the thyroid gland (6).

5. Conclusions

There is a link between the toxic thyroid gland and eye disorders. When the thyroid gland generates too much thyroid hormone, a condition known as hyperthyroidism develops, which can cause eye problems such as bulging eyes (exophthalmos), double vision, dry eyes, and light sensitivity. Graves' disease, an autoimmune disorder that affects the thyroid gland and the eyes, is the name given to this syndrome. In this disorder the immune system targets the thyroid gland, leading it to release an excessive amount of hormone, affecting the muscles and tissues around the eyes. Exophthalmos, or bulging eyes, can result from inflammation and swelling of the eye muscles. This can also result in a visual loss in severe circumstances. Therefore, individuals with hyperthyroidism or Graves' disease need to have regular eye exams and seek medical attention if they experience any changes in their vision or eye health.

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7. Conflict Of Interest

There is no conflict of interest.

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فك شفرة العلاقة بين اعتلال العين والتسمم الدرقي: دراسة مركزية

الخلاصة: عندما تصبح الغدة الدرقية مفرطة النشاط أو غير نشطة، قد تحدث مجموعة متنوعة من المشكلات الصحية، بما في ذلك أمراض العيون. هرمون الثيروكسين (T4) وهرمون ثلاثي ايودوثيرونين (T3) هما الهرمونان الأساسيان اللذان تنتجهما الغدة الدرقية. هذه الهرمونات ضرورية للحفاظ على وظيفة العين السليمة. عندما تكون الغدة الدرقية مفرطة النشاط، يمكن أن تسبب مجموعة متنوعة من اضطرابات العين على سبيل المثال: اعتلال العين جريفي. **الهدف:** لاستكشاف الصلة المحتملة بين اضطرابات العين والغدة الدرقية السامة، وتحديدًا كيف يمكن لفرط نشاط الغدة الدرقية أن يساهم في تطور أمراض العيون مثل اعتلال العين جريفي. الهدف النهائي هو تعزيز نتائج المرضى من خلال معرفة وإدارة أفضل لهذه الأمراض المعقدة. **طرق العمل:** تتوفر عدة طرق لتقييم الصلة بين مشاكل العين والغدة الدرقية السامة. من بين هذه الطرق اختبارات وظائف الغدة الدرقية وفحص شامل للعين: تشمل اختبارات وظائف الغدة الدرقية، قياس مستوى عدة هرمونات (TSH, T4 and T3) لمعرفة ما إذا كان هناك خلل أساسي في الغدة الدرقية ينتج عنه تشوهات في العين. **النتائج:** شملت الدراسة 100 مريض، 81% منهم نساء. تعتبر مشاكل العين الفردية أكثر شيوعًا في المرضى الذكور منها لدى الإناث. تم الإبلاغ عن جحوظ العينين من قبل حوالي 70% من الرجال في أغلب الأحيان. أبلغ المرضى أيضًا عن احمرار في العين (68%)، وذمة أو تورم في الجفون (67%)، وجفاف في العين (61%). كانوا أقل عرضة لظهور ضبابية في الرؤية، لكن حوالي الثلث لديهم. **الاستنتاج:** يمكن أن يؤدي فرط نشاط الغدة الدرقية ومرض جريفي إلى مشاكل في العين مثل جحوظ العينين، وازدواج الرؤية، وجفاف العينين، والحساسية للضوء. من المهم إجراء فحوصات منتظمة للعين وطلب العناية الطبية في حالة حدوث أي تغييرات.

الكلمات المفتاحية: أمراض العيون؛ الغدة الدرقية السامة، مرض جريفي.