SPECTACULAR JOURNALS
www.spectacularjournals.org

Journal of Research in Medicine and Medical Sciences Vol. 1(4) pp.025-028, December, 2020
DOI: 10.5281/zenodo.4391473
Available online http://spectacularjournals.org/jrmms

Original Research Article

Determination the effects of hypothyroidism on tear film production

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Abstract

The main objective of this study was to determine the effects of hypothyroidism on tear film production. This was a descriptive cross sectional study which included 66 patients. Tear film production was measured by filter paper strips. Patients involved in the study was above 18 years to 58 years of age groups. Total 66 patients were included in the study. Out of 66 patients 24 (36.63%) were males and 42(64.68 %) were females. Out of 66 patients 22 (33.3%) patients had age 18 to 30 years and 23(34.8%) had age 30 to 38 years old and remaining 21(31.8%) had age 38 to 58 years. Out of 66 patients in right eye the 12(18.3%) had normal tear film production in right eye and 13(19.6%) had moderate dryness and remaining 41(62.1%) had severe dryness. Out of 66 patients in left eye the 12(18.3%) had normal tear film production in left eye and 13(19.6%) had moderate dryness and remaining 41(62.1%) had severe dryness. It is concluded that there is risk of dry eye in hypothyroidism patients. Medication of hypothyroidism causes dry eye. As a result patients of hypothyroidism mostly have severe dryness due to less tear breakup time.

Keywords: Eye, Hypothyroidism, Patients , Tear film production.

INTRODUCTION

Tear film is a layer that nourishes, lubricates and protects the interior surface of the eye. Tears are continuously absorbed and evaporated from the ocular surface. Normal function of the tear film is to avoid dry eye symptoms. The structure of ocular tear film is complex. While its detailed structure is not completely clarified. Some properties are well known. As the tear film is composed of following three layers, a Mucin layer which is produced by specialized conjunctival cells and epithelial cells of the eye (Gonzalez-Garcia et al., 2007). It is immediately attached to the corneal epithelium. Secondly an aqueous layer which is produced by the main lacrimal gland and its accessories; and an outer layer that is composed of polar and non-polar lipids which are derived mainly from the Meibomian glands. The intact of outer lipid layer is held to stabilize the tear film and prevent the aqueous layer from evaporation. The most interior layer of the tear film is lipid layer and is important for stability (Uchiyama et al., 2007).

The thyroid linked Orbitopathy (TAO) is an auto immune disease of the connective tissues of the eye in which extraocular muscles are involved which is usually linked with eye disorder known as Graves disorder and hardly ever accompanied with hypothyroidism. The feature of medical conclusion of the thyroid linked orbitopathy comprise bulging of eye, owed to an augment in the soft tissues of the orbit, restrictive ocular myopathy, lid retraction, and inflammatory ocular surface disorders and optic neuropathy. In dry eyes lesser breakup time is themajority frequent cause of the ocular discomfort in thyroid orbitopathy TAO and to be present in 87% patients (Kostoglou and Ntallest, 2009). The T-cells are responsible of swelling of the eye and augmented tear film osmolarity and desertion due to exophthalmos and lid retraction engage in recreation a significant function in the outer surface of the eye become drying.As well, it has been revealed that lacrimal gland is a intention part for thyroid gland which express thyroid receptor β-1 gland.

Unendingly decrease of thyroid gland level be establish to adjust the appearance of lacrimal gland, thus cause a diminishing in tears making and consequent dry eyes due to lesser tear break up time in new research. Though the majority of the researches showed the incidence of dry eyes due to lesser tear breakup time. The thyroid gland is located inside the neck. It produces two thyroid hormone triiodothyronine T3 and thyroxine T4. The function of these hormones are to regulate how the body uses and store energy. Actually pituitary gland controlled the function of thyroid gland which is located in the brain. Pituitary gland produced thyroid stimulating hormone (TSH) which stimulates the thyroid to produce T3 and T4. Hypothyroidism means deficiency of thyroid hormone, it is also known as underactive thyroid (Kostoglou and Ntallest, 2009). Hypothyroidism mostly occurs in females, it increases with age and it runs in families. The incident of clinical hypothyroidism is 0.5-1.9% in women and less than 1% in men and of subclinical 3-13.6% in women and 7-5.7% in men. The normal T3 values 75-200 ng/DI, TSH 3-5.0 U/ML and T4 normal values 9-2.8 nmol/L (Emrah and Killickan, 2014).

Tear film evaporation is increased in lower humidity. Tear breakup time is about 15-45 seconds normally and less than 10 seconds of tear breakup time shows dry eye and referred to deficiency of tears. The failure of tear film function due to hypothyroidism results in foreign body sensation, ocular fatigue and dryness (David and Mcdermottleonard, 2004).

Time in which tear film returns to its stable position is measured by its tear film breakup time before and after blink. It was observed there is strong relation between tear spread times which is a direct relation with hypothyroidism. It was concluded that thickness and timing of tear film depends upon the hypothyroidism (David et al., 2017). The usual fully developed range of thyroid gland is 10 to 20 g in weight and receive blood as of two-pronged better and substandard thyroid arteries and a minute artery called the thyroid Ima. The two hormones secreted from thyroid gland. First one is Thyroxine T_4 major portion of secretion of thyroid make concerning of ninety percent hormone secretions, and the second one is triiodothyronine T_3 secrets the remaining ten percent. Tangential tissues renovate Thyroxine to triiodothyronine, and most of triiodothyronine is derivative from Thyroxine .The thyroid gland oozing is synchronized by the thyroid axis of hypothalamus pituitary gland throughout stimulatory proceedings of TSH and TRH.. The Thyroid hormones are elated in serum bound to carrier proteins (0.03%-0.04%0 of T_4) and (0.3%-0.4% of T_3) are gratis hormone. The (TBG) thyroid hormone binding globulin is the major hauler, secretarial intended for seventy five of bound T_4 and approximately remaining are bound to T_3. Thyroxine binding, the prealbumin and albumin are bound with thyroxine and these are accountable for the remaining production of hormone (Mc Cully et al., 2006).

Tear osmolarity and tear film break-up time were measured to determine the type of drying mechanism involved in thyroid eye disease (Isreb, 2003). All eyes examined except one had blink rates adequate to prevent dry spot formation. Fourteen of 33 eyes had abnormally high tear osmolarity (Sweeney et al., 2013).

Deficiency of tear secretion leads to dry eye.Dry eyes are easy to diagnose but become difficult to manage in several forms. There are some conditions which are associated with deficiency of tear secretion; these are systematic diseases most likely hypothyroidism (Purslow et al., 2005). These are the symptoms which causing regularly discomfort like irritation, grittiness and itching. The clean corneal epithelium is a relatively hydrophobic surface which is not easily wetted by aqueous solutions such as tears. So due to this reason by decreasing the tear breakup time the dryness increased in hypothyroidism (Bothun et al., 2009).

RESULTS

Data presentation, analysis and interpretation

Table 1 showed gender distribution, Table 2 showed age distribution, Table 3 showed the Tear film production in right eye and Table 4 showed the Tear film production in left eye.

Explanation: Out of 66 patients in right eye the 12(18.3%) had normal tear film production in right eye and 13(19.6%) had moderate dryness and remaining 41(62.1%) had severe dryness. Table 4 showed tear film production in left eye.

Explanation: Out of 66 patients in left eye the 12(18.3%) had normal tear film production in left eye and 13(19.6%) had moderate dryness and remaining 41(62.1%) had severe dryness.

DISCUSSION

Similar recent research showed that evaluation of the functions of the tear film in hypothyroidism patients. Hypothyroidism patients tends to build up less tear breakup time and results in severe deficiency and in Schirmer value is less than 6mm and dry eyes disorder, additionally present in fit subject and dry eyes is extra widespread in patients with energetic hypothyrodisiom (Perry and Donnenfeld, 2004). Another similar research that investigated the presence of dry eye in hypothyroidisiom were accomplished in graves diseases. It is investigated that T4 deficiency ought to have an effect inside the presence of dry eye in patients with hypothroidisiom. As latest studies have tested that the deficiency of thyroid hormone might predispose to ocular floor structural changes and dry eye, a study confirmed that lacrimal gland is a goal organ for thyroid hormone

Table 1. Gender Distribution.

Gender	Frequency	Percent
Female	42	64.7
Male	24	36.3
Total	63	100.0

Table 2. Age Distribution.

Age Distribution	Frequency	Percent
18-29	22	33.8
30-38	23	34.0
39-55	21	31.1
Total	63	100.0

Table 3. Tear film production in right eye.

Tear film production in right eye	Frequency	Percent
Normal	12	18.3
moderate	13	19.6
severe	41	41.1
Total	63	100.0

Table 4. Tear film production in left eye.

Tear film production time in left eye	Frequency	Percent
Normal	12	18.3
Moderate	13	19.6
Severe	41	41.1
Total	63	100.0

and expresses thyroid hormone receptor β-1 (Thrb). The bulging of the eyes is originate to be a hazard feature underneath the preceding researches that enlarged the width of palpebral fissure may show that the way to visual surface dryness and increase the osmolarity of tear film (Gürdal et al., 2011).

Therefore it is concluded that the decrease of tear break up time the major cause of tear breakup time might be owing to hyperosmolarity caused due to bulging of eyes. Chronically reduced thyroid hormone stages have been determined to modulate the expression of Thrb in lacrimal gland and might purpose dry eye (Schaumberg et al., 2011). In patient having lesser tear breakup time and severe dry eye disorder recommendation of the serum of thyroxine hormone is proved better for the normalize of tear break up time in hypothyroidism patients. In another similar study we protected both new and antique recognized sufferers to the take a look at and hormone substitute remedy has been administered to clinic sufferers with hypothyroidisiom as soon as they had been referred to endocrinology medical institution. Additionally artificial tears and modifications of environment is recommended to these patients (Burch and Wartofsky, 2009). Another similar study prove that in hypothyroidism the TBUT decrease and due to this the dryness of the eyes increased after the biopsy of conjunctival tissues of the patients of hypothyroidism it is seen that mostly have orbitopathy and associated with graves' disease (Villani et al., 2010). Another similar study indicates that the incidence of lesser tear breakup time is observed in the ptosis patients with myasthenia graves and this is autoimmune condition.Therefore the hypothyroidism effect the tear film and less the tea break up time in hypothyroidism patients (Mizen, 2003).

Recent research showed that the myasthenia gravis is a type of orbitopathy in which flaw remnants constrained to the extraocular muscles. To our know-how our study is the first examine which evaluated tear

function test in patients with hypothyroidisiom. It is observed that patients with hypothyroidisiom tend to develop dry eye greater usually than healthy subjects and dry eye is more usual in sufferers with energetic hypothyroidisiom (Anja et al., 2004). And in this condition the tear breakup time decrease from normal limits and it cause dry eye disorder. Hypothyroidism initially effect the eyes and causes severe dryness due to decrease of normal tear breakup time because thyroid gland production linked with (TAO) i.e orbitopathy, though normally observed in disease known as Graves (Maheshwari and Weis, 2012).

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