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Mini Review

Hormonal Regulation of the Dry Eye

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Abstract

For protection of environmental insults and clear vision the outer most surface (the cornea) of the human eye has to be kept moist with the secretion of the lacrimal gland. During old age (in both the genders) and certain physiological conditions (in females) the patho physiological conditions of lacrimal gland alter which results in Dry/Wet eye. Most of the menopausal women and young males and females face dry eye disorder due to environmental insults and therefore, we hypothesize that the acinar cells of lacrimal gland should have estrogen receptors. In support of this earlier we have localised estrogen receptors on eye lens epithelial cells that also regulated by sex steroid hormones.

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INTRODUCTION

The "Human Eye" is in many ways, a special sense organ compared to the rest of the four sense organs present on human body [1]. Some parts of the eye are richly supplied with blood whereas others are completely devoid of it in order to maintain transparency for clear vision. In addition to its "Camera Box" for image formation it is also associated with many glands. Vision problems may occur for a variety of reasons [2]. Surprisingly many of its functions are regulated by sex steroid hormones. Eyes functions can be affected by hormonal fluctuations [3,4]. Hormones regulate many important body functions that can indirectly affect the eyes too. When there is change in hormone level may be due to normal physiological, pathological or by hormonal change and certain medicines which influence sex hormones (birth control pills), vision is also affected. An imbalance in hormone levels could actually be the underlying cause. Androgens regulate the lacrimal and meibomian glands, some researchers have theorized that androgen levels play an important role in dry eye by regulating secretory functions of lacrimal glands [4,5].

IMPAIRED VISION AND MENOPAUSE

During menopausal transition years, many hormonal changes occur in female body [6]. After menopause, the body makes less reproductive hormones, such as estrogen and progesterone; these hormones are the predominant ones to cause variations in IOP [7]. In fact, eye sight and even eye shape also can change.

One of the lesser known symptoms of menopause is dry eyes. Dry eyes are caused by problems with tears [8]. Everyone has a tear film that covers and lubricates their eyes. Tear film quality depends on fine regulatory mechanisms affected by neuronal and hormonal influences. Estrogen, the main sex hormone in women, can cause the cornea to become more elastic, changing the way light travels through the eye. Both of these changes can lead to blurry vision and difficulty wearing contact lenses.

The lacimal gland is composed of acinar, ductal and myoepithelial cells out of which the bulk (80%) is made of acinar cells [9], and are the site for synthesis, storage, and secretion of proteins. The lacrimal glands secrete lacrimal fluid, which, when the eyes blink, is spread across the surface of the eye. Corneal sensory nerves stimulate the lacrimal gland by a trigeminal-parasympathetic reflex (10). The lacrimal gland secretes a complex aqueous milieu rich in antibodies, cytotoxic agents, and growth factors onto the ocular surface to protect the cornea from desiccation, infection, and vascularization while promoting wound healing and transparency. Earlier, for the first time, we have shown the estrogen receptors on the eye lens epithelium (3), but there is no evidence for this finding in the lacrimal gland acinar cells. However, since, the gland is regulated by steroid hormones it is safe to assume that the acinar cells from lacrimal gland must have estrogen receptors.

DRY/ WET EYES AND POST MENOPAUSE

It is essential for many reasons to keep the outermost layer, the cornea, have to be continually kept wet and it is done by basal tears. Tears lubricate the eye and help keep it clear of dust, prevent from infection, provide nourishment and keep the cornea healthy and provides clear vision. Tears contain water, mucin, lipids, lysozyme, lactoferrin, lipocalin, lacritin, immunoglobulins, glucose, urea, sodium, and potassium. Tear over-secretion is usually caused by irritation or inflammation of the surface of the eye. This can occur for a number of reasons, including eyelash and eyelid problems or allergies (11).

Oddly, a dry eye problem can sometimes cause watery eyes, because the eye produces excess tears to combat the irritation

and dryness. It may not make sense, but dry-eye syndrome often leads to watery eyes. One reason eyes water in the morning is the very reason it's tough to open your eyes in the first place - the light. After being closed for hours, the pupils react to the sudden brightness of morning by producing tears. While the bright light of day could be a cause of watery eyes, so could dry eye syndrome

Dry eye affect 10-15% of the adults in old age [8]. Dry eye is a common and often chronic problem, particularly in older adults. Although dry eyes can affect both men and women at any age, the condition is more common among women, especially after menopause. besides old age, there are a few more causes for persons to have dry eye syndrome, e.g. eyelid abnormalities, naso-lacrimal drainage pathologies, neurological causes, corneal disorders, irritation of lashes and hypersecretion of tears [13]. This may be due to hormonal changes The cause of dry eyes is an imbalance in the composition of the tears, decreased tear production or excessive tear evaporation. A common underlying factor of dry eyes involves tears – not making enough of them, having poor tear quality or rapid tear evaporation (14). The exact role played by menopause in the development of dry eyes is not well understood, but many women who are beginning to experience menopause or who are post-menopausal suffer from dry eye symptoms. Estrogen fluctuations may cause Dry Eye. This is particularly true for women after menopause. The knowledge of influence of sex hormones on the etiology of tears in old age has opened new avenues for research, to find out specific treatment measures.

If tears don't have enough oil in them, they can evaporate (get absorbed into the air) before the eyes get enough moisture--the most common cause of dry eyes. This often happens when the glands that manufacture tears their oily texture are blocked. The meibomian glands on the eye lids also do not function properly and become sick. However it's not very serious problem and can be treated with warm washcloths and lid scrubs that clear away the dead skin, oil, and bacteria that can build up and plug the glands.

The most common symptoms of dry eye syndrome are burning, pain, and redness in the eyes. Other common symptoms include watery tearing or stringy mucus in the eyes. The eyes get tired faster than they used to or that you have difficulty reading or sitting at the computer for long periods. And most of them have no idea why their eyes are watery and irritated.

Dry eyes are also associated with medical conditions such as rheumatoid arthritis, lupus, scleroderma and Sjogren's syndrome [13]. Damage to the tear glands from inflammation or radiation can hamper tear production common medications used by geriatric population can also cause dry eyes. These include antihistamines, decongestants, sleeping pills, tricyclic antidepressants, Isotretinoin-type drugs for treatment of acne, opiate-based pain relievers such as morphine.

CONCLUSION

Dry eye disorder is a multifunctional phenomenon. Generally it is an old age disease; though it is not a life threatening disorder, however, quality of life is very much compromised. From existing literature it is not possible to pinpoint any one cause, nevertheless, circumstantial evidence points towards malfunctioning of acinar cells which may be due to misregulations of either neurological or endocrinological or both. The decisive proof would come from the presence of steroid hormone receptors on acinar cells, that is still lacking in this area.

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