

Ocular tissue responses to sex hormones

Sir,

The last two decades have seen tremendous advancements in endocrinology. Yet, there exists a wide gap in our knowledge regarding the gender-based differences and hormonal receptors in the ocular tissue. The developmental, anatomical, and physiological ocular parameters differ significantly in males and females.^[1,2] Sex steroid hormones (SSHs), such as estrogen, progesterone, and androgen, may be related to various ocular pathologies, as they can act through SSH receptors present in the ocular tissue. Any pathology which is going to affect the levels of these sex hormones can affect the ocular tissues as well.^[1,2]

Dry eye is more common in females. It has been successfully established that androgen controls the various biochemical and physiological aspects of the lacrimal apparatus and is deficient in females. The observations have been further strengthened by the increased association of dry eye during pregnancy and lactation.^[3] However, the role of hormone replacement therapy (HRT) remains inconclusive in the treatment of dry eye in females.^[1,2]

The conjunctival tissue shows cyclic variations in conjunctival epithelium during menstruation and menopause. Even the maturity of the conjunctival tissue strongly correlates with the levels of estrogen. Another surprising fact is the bleeding through ocular tissue which accounts for 1% of all extragonadal sites of vicarious menstruation.^[4]

Various studies have observed a significant relationship between SSH and altered corneal functions and topography under different physiological conditions. The same has been proved by the presence of estrogen receptors, progesterone receptors, and androgen receptors in the nuclei of corneal epithelium. The changes in the corneal curvature and thickness during pregnancy, premenstrual phase, and lactation can result in visual changes and can have deranged performance due to vision disturbances.^[2,5]

The incidence of cataract is much higher in postmenopausal females as compared to males of similar age groups. SSHs seem to exert a significant role in prevention of cataract formation in post-menopausal women as observed by one large study. The protective action of estrogen is most probably due to maintenance of the ionic composition and hydration status in the lens.^[1,6]

There is a substantial evidence to suggest a relationship between estrogen and retinal disorders. Through various

known and unknown mechanisms, estrogen exerts a protective role in prevention of retinal changes by various genomic and nongenomic effects.^[7] Estrogen deficiency is associated with increased incidence of macular degeneration in post-menopausal women as has been observed by the Eye Disease Case–Control Study Group.^[8]

The possible therapeutic role of SSH in treatment of glaucoma has also been observed. There is enough literary evidence available which confirms the lowering of intraocular pressure (IOP) in post-menopausal females with estrogen treatment, as compared to no significant clinical effects in males and pre-menopausal females with similar therapeutic interventions. The hormonal control of IOP has been observed by various studies which have highlighted an increase in IOP during the menstrual period and successful lowering of IOP with estrogen and progesterone in glaucoma patients.^[1,2,9]

There is an increased evidence that programmed cell death in different ocular tissues is mediated by variable gene expression which in itself gets influenced by gender-related differences.^[10] Melatonin, which is also secreted from retina besides its primary secretion from pineal gland, tends to modulate the hypothalamic neuroendocrine axis, thereby controlling the secretion of SSH.^[11]

Physicians should be aware of the effects of SSH on the eye. There should be large studies in this direction so as to widen our understanding of gender differences in ocular diseases, keeping in mind possible sexual dimorphism in human ocular tissue. Better understanding of this aspect of endocrine ophthalmology can make therapeutic interventions more precise and effective.

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REFERENCES

- Gupta PD, Johar K Sr, Nagpal K, Vasavada AR. Sex hormone receptors in the human eye. *Surv Ophthalmol* 2005;50:274-84.
- Wagner H, Fink BA, Zadnik K. Sex- and gender-based differences in healthy and diseased eyes. *Optometry* 2008;79:636-52.
- Sullivan DA. Tearful relationships? Sex, hormones, the lacrimal gland, and aqueous-deficient dry eye. *Ocul Surf* 2004;2:92-123.
- Sikorski R, Toczolowski J, Liber B, Jedrzejewski A. [Supplementary bleeding into the vitreous body]. *Pol Tyg Lek* 1978;33:1217-8.
- Kiely PM, Carney LG, Smith G. Menstrual cycle variations of corneal topography and thickness. *Am J Optom Physiol Opt* 1983;60:822-9.
- Leske MC, Wu SY, Nemesure B, Yang L, Hennis A; Barbados Eye Studies Group. Nine-year incidence of lens opacities in the Barbados Eye Studies. *Ophthalmology* 2004;111:483-90.
- Evans JR, Schwartz SD, McHugh JD, Thamby-Rajah Y, Hodgson SA, Wormald RP, *et al*. Systemic risk factors for idiopathic macular holes: A case-control study. *Eye (Lond)* 1998;12:256-9.
- The Eye Disease Case-Control Study Group. Risk factors for central retinal vein occlusion. *Arch Ophthalmol* 1996;114:545-54.
- Mitchell P, Smith W, Attebo K, Healey PR. Prevalence of open angle glaucoma in Australia. The Blue Mountains Eye Study. *Ophthalmology* 1996;103:1661-9.
- Wilson SE. Stimulus-specific and cell type-specific cascades: Emerging principles relating to control of apoptosis in the eye. *Exp Eye Res* 1999;69:255-66.
- Rufiange M, Dumont M, Lachapelle P. Correlating retinal function with melatonin secretion in subjects with an early or late circadian phase. *Invest Ophthalmol Vis Sci* 2002;43:2491-9.

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