Acta Scientific Ophthalmology

Volume 2 Issue 6 July 2019

Short Communication

# Epidemiological Profile of keratoconus in Middle East

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**Received:** June 25, 2019; **Published:** June 28, 2019

Keratoconus is a noninflammatory corneal disorder characterized by a progressive protrusion and corneal thinning. It is leading to blurred vision and visual impairment. The etiology and pathogenesis of keratoconus is not clearly established but one of the most common hypotheses of pathogenesis is cascade in which the enzymes in lipid peroxidation and/or nitric oxide pathways are abnormal or defective and result in corneal proteins altered. The associated risk factors are: eye rubbing, atopic disease, connective tissue disease, Down's syndrome, tapetoretinal degeneration and inheritance. The incidence of keratoconus differs according to the geographical location around the world. Hot and sunny environments characterize the Middle East nations that are unique from the other nations. The climate can therefore affect the induction of keratoconus, in particular the oxidative damage induced by excessive sun exposure to ultraviolet light rays that can trigger collagen and enzyme.

In,1986 research by Kennedy in Minnesota USA showed the incidence to be 6/1000 and 4/1000 according to Applebaum. In UK research by Pearson., et al. showed an annual incidence of 19.6/100000 keratoconus in Caucasian and 4.5/100000 in Asian societies. This distinction in keratoconus in genetic, nutritional and environmental variables among distinct populations is likely multifactorial.

The Middle East countries, a study conducted by Assiri., et al, to assess the incidence and severity of keratoconus in Assir province, Saudi Arabia. The results showed the incidence is 20 cases per 100 000 population. According to a study in Egypt conducted by Othman., et al, the incidence of keratoconus was 1.7%. Jonas., et al, did a study in India to evaluate the prevalence and associated factors of keratoconus in the adult population the prevalence was 2.3%.

Keratoconus management depends on the stage and development of the disease. However, it is not possible to correct irregular astigmatism with spectacles. Hard contact lenses can give the patient a better sight. New imaging techniques such as corneal topography and optical coherence tomography (OCT) of the anterior segment can be useful in fitting contemporary lenses and give different appropriate alternatives.

Corneal collagen cross-linking (CXL) is a technique for altering the corneal stromal structure based on the interaction of 370 nm UVA with topical riboflavin (vitamin B) for 30 minutes. It prevents the development of disease by forming chemical bonds between collagen fibrils.

However, corneal thickness tending to decrease to below 400 μm in advanced KC corneas, the conventional strategy may result in loss of endothelial cell count. Hypo-osmolar riboflavin solution for thin corneas is therefore suggested. Instead of standard time-consuming cross-linking protocol, the alternative technique or high-fluence accelerated CXL is used today.

Intrastromal corneal ring segments (ICRS) are implanted deep in the stroma to reduce the corneal curvature. In general, the best candidates for intracorneal ring segments are keratoconus patients in the moderate and severe stage of the disease who have no corneal scarring and cannot tolerate contact lenses. For cases with Kmax>70 D, corneal opacity, central corneal scarring or hydropsis, rings are contraindicated. Surgical achievement and enhancement of vision rely on a number of variables such as correct ring positioning, precise depth of implantation, and optical diameter. In nowadays strategy, MyoRing is performed in patients with advanced keratoconus using femtosecond laser coupled with accelerated CXL using Dextran-free riboflavin. It is secure, efficient and enhances visual acuity.

Toric Phakic intraocular lenses (PIOLs) are intended for situations of high irregular astigmatism for progressive keratoconus and can be coupled with CXL or ICRS concurrently. Side effects include glare and halos, intraocular pressure elevation, lens deposits, induced astigmatism, and loss of corneal endothelium. Today, with enhanced lens models and materials and the advent of foldable intraocular lens designs that enable for tiny incision surgery, the risk of complications is significantly decreased.

Depending on the extent of corneal scarring, keratoplastic (penetrating or lamellar) is used in patients with advanced keratoconus who cannot attain adequate vision with contact lenses, glasses or even ICRS.

The development of new techniques such as femtosecond-assisted DALK enables the surgeon to make incisions at specific depths and precision levels of 0.1 mm without damage to the surrounding tissues and thus to better match the donor tissue with the host tissue, which can lead to faster visual rehabilitation.

Conductive keratoplasty (CK) is a method that is non-invasive and that saves tissue. The power of the radio wave (350 HZ) is applied at 8–32 points to the corneal stroma. Because of the heat generated, the temperature of the tissue can rise to 65 ° C, resulting in continuous collagen shrinkage, corneal steepening in flat areas, and correction of refractive errors by corneal remodeling. CK requires to be combined with other alternatives, or the surgeon may need to use more areas to correct elevated astigmatism or keratoconus in flat regions.

Digk., et al, in 2014 proposed a novel surgical technique called Bowman layer transplantation (BL transplantation). As the bowman layer destabilizes and undergoes layer fragmentation with development of disease, corneal ectasia happens in keratoconus. Thus, in order to enhance corneal stability and discourage disease development and ectasia, novel therapy modalities aim to graft an isolated bowman layer in the mid-stroma.

A pocket is developed in the midstroma in this technique where an isolated layer of bowman is inlayed. To avoid corneal perforation, this method is appropriate for very thin corneas.

Studies have shown that while keratoconus is a multifactorial disorder, genetic variables and favorable family history greatly affect the pathogenesis of the disease with a rate of 5% to 28%. Those with a family history of the disease are 15-67 times more probable to develop the disease. Keratoconus and consanguineous marriages may correspond to each other. In Saee-Rad., et al. research. In Iran, three genes of SOD1, TGF-β1, and DUSP1 were researched after RNA extraction from regular and keratoconus corneas. Of these, it has been discovered that TGF-β1 and DUSP1 genes play an efficient part in the growth of inflammatory processes and can help to better emphasize the pathogenesis of the disease. By recognizing pathogenic genes and modifying the architecture of cell proteins, gene therapy can be a very promising and efficient way to alter the course of the disease.

In conclusion, advanced technology today is very helpful in understanding keratoconus pathophysiology and diagnosis. Although improved surgical techniques and be precise in patient selection for special management is the most important factor for achieving optimum results. In the future, further innovations in keratoconus therapy techniques will make selecting the most suitable technique for each patient and predicting results interesting for practitioners [1-11].

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**Volume 2 Issue 6 July 2019**