INTRODUCTION

Mechanics study forces that result in movement or equilibrium. It is the analysis of any dynamic system and strength of materials. ***Biomechanics*** is concerned with the medical application of mechanical concepts. It seeks to understand the mechanics of living systems. Organ biomechanics helps us to understand its normal function, predict changes due to alterations. The eye is a structure that moves or changes its shape in response to forces such as the IOP, extra-ocular muscles and surgical intervention and hence can be studied through applied mechanics (Fung, 1981).

The ***cornea*** reacts to stress as a ***visco-elastic*** material. The visco-elastic response consists of an immediate deformation followed by a rather slow deformation. The immediate elastic response seems to reflect the immediate elastic properties of the collagen fibers, and the steady state elastic response reflects the properties of the corneal matrix (Edmund, 1988).

Since awareness of ***corneal biomechanics***; studies have renewed to measure such a property. A particularly interesting technique has emerged during the last few years; ***Ocular Response Analyzer*** *(**ORA**)*, that enables a dynamic measure for IOP including two applanation events, respectively. Theoretically, these two pressures should be the same, but this is not the case, which represents the resistance of the corneal tissue to applanation due to its visco-elastic properties. The difference between the inward and outward pressures is termed ***hysteresis*** and is measured in millimeters of mercury. It is a measure of: corneal damping capacity, visco-elasticity & energy absorption capability of cornea (Wells et al, 2008).

Corneal Hysteresis (CH) can be used to identify and classify various corneal pathologies; depending on the biomechanical properties of corneal tissue. Subjects whose corneas exhibit low corneal hysteresis, which can be thought of as having a "soft" cornea, are probable candidates for a variety of ocular diseases and complications (Gatinel et al, 2007).

As CH represents the cornea's biomechanical state, it has potential uses in screening ***refractive surgery*** candidates and predicting / controlling outcomes. Currently, central corneal thickness **(**CCT) is the primary factor used for such screening procedure. However, CH could provide a more accurate characterization of the biomechanical state of the cornea than does the measure of CCT due to the large and easily identifiable differences in hysteresis between normal and compromised corneas. This observation, is coupled with the fact that corneal hysteresis is only weakly correlated with CCT (Ambrósio et al, 2007).

There is a significant reduction in ***post-Lasik*** hysteresis, which is not primarily a function of reduction in corneal tissue, but rather a result of a weakening of the structure due to the flap (Gatinel et al, 2007). Also, CH enables the calculation of a new pressure measurement called ***IOPCC*** (corneal compensated). This measurement is less influenced by corneal properties such as CCT than those provided by Goldmann Applanation Tonometry; hence its importance to measure IOP following refractive surgery procedures (Medeiros and Weinreb, 2006).

Keratoconic eyes are known to be more elastic and less rigid than normal eyes. Hysteresis was significantly higher in normal than in keratoconic eyes. It may be a useful measurement in addition to CCT (Shah et al, 2007).

Corneal Hysteresis is affected also after *clear corneal cataract surgery*. At day one, after surgery, CH is diminished, whereas CCT is increased significantly. Postoperative corneal edema leads to a change of corneal visco-elastic properties, resulting in a lower damping capacity of the cornea (Hager et al, 2007).