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# Relationship of Age and keratometry readings of the cornea to Central Corneal Thickness among 98 patients performing refractive surgery in Ibsar center for refractive surgery

## (العلاقة بين العمر ومعامل التقوس اوالانحناء للقرنية مع السمك الوسطي للقرنية ل٩٨ شخص)

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## Abstract

This study is involved in viewing the relationship between the age and keratometry readings of cornea with the central corneal thickness among 98 patients performing refractive surgery in Ibsar center for refractive surgery in Najaf between the period This study was performed in Ibsar center for refractive surgery in Najaf from November 10 , 2013, to April 20, 2014 for patients who underwent refractive surgery for one or both eyes, no abnormality or any disease were found in the examined eyes apart the refractive error that they come for correction.

The CCT of patients was measured using the Scheimpflug HR imaging system (Pentacam),
98 patients were taken 40 males and 58 females
Age between 18 to 61 years
There is no significant difference between K1 and K2 of the right eye
and also no significant difference between K1 and K2 of the left eye
there is high significant difference between K 1 and K2 readings for that of females from that of males.
There is no significant difference between age with any of the variables K1,K2 right eye and K1 , K2 left eye
There is no significant difference between age and the CCT of the right eyes and the left eyes
No significant difference between the CCT of the right eye from that of the left eye

**الخلاصة**

هذه الدراسة تعنى بإيجاد العلاقة بين العمر و معامل الانحناء او التقوس للقرنية مع السمك الوسطي للقرنية بين بعض الاشخاص الذين يرومون اجراء عملية تصحيح البصر بطريقة الليزر في مركز ابصار لعلاج العيون بالليزر في محافظة النجف الاشرف للفترة من 10 تشرين الثاني 2013 و لغاية 20نيسان 2014.مجموع الاشخاص كان98 شخصا بينهم 40 رجلا و 58 امراه .وجد من الدراسه انه لا يوجد اهميه احصائيه بين معامل الانحناء او التقوس الاول و الثاني للعين اليمنى و كذلك الحال بالنسبه للعين اليسرى.وجد انه هنالك اهميه احصائيه بين معامل الانحناء او التقوس الاول و الثاني للسيدات عنه في الرجال .لايوجد اهميه احصائيه لسمك القرنيه للعين اليمنى عنه في العين اليسرى لجميع الاشخاص.لايوجد اهميه احصائيه للعمر مع سمك القرنيه لجميع الاشخاص

## Introduction

The normal range for the corneal thickness of adult people is in the range of 554.+/-32.5 Um **(1)**

For clinical applications, accurate corneal curvature measurements are important for phakic and aphakic cataract surgery, pre- and postrefractive surgery, and contact lens selection. Therefore, evaluating the instruments that precisely measure anterior corneal curvature is clinically important. Currently, a number of instruments are available for assessing corneal status and measuring corneal curvature, including Scheimpflug topography, optical coherence tomography, optical low-coherence reflectometry,partial coherence interferometry, and slit-scanning topography/pachymetry systems**(1),(2),(3),(4),(5)**

Central corneal thickness (CCT) is an important parameter in patient screening before any refractive surgeries. Keratometry measurement has also been identified as a contributing factor that influences visual outcome in hyperopic patients after refractive procedures

.1 Two of the main risk factors associated with the development of postrefractive corneal ectasia are CCT below 500 μm and mean keratometry greater than 47.00 D.

2 It is important to better understand the relationship between risk factors and other ocular parameters (i.e., refractive error) to optimize refractive treatments.

Several studies have shown that axial length (AL) is strongly correlated to the degree of refractive error.**(3–5)**

Corneal radius of curvature (CR) has also been studied extensively. Although some studies reported no correlation between refractive error and CR in different refractive groups,**(6)** others have found that myopic subjects have a smaller CR than emmetropes.**(7),(8)**

## Method:

This retrospective study was performed in Ibsar center for refractive surgery in Najaf from November 10 2013, to April 20, 2014 for patients who underwent refractive surgery for one or both eyes, no abnormality or any disease were found in the examined eyes apart the refractive error that they come for correction.

The CCT of 98 patients was measured using the Scheimpflug HR imaging system (Pentacam), Keratometry in two main meridians of the cornea (K1, K2) was measured with the Scheimpflug HR imaging system (Pentacam)

Age and preoperative spherical equivalent
were recorded for all patients. The entire population and subgroups
classified to age and spherical equivalent were analyzed.
manifest refraction, cycloplegic refraction, wavefront analysis, SE, and CCT were recorded.
the smallest corneal thickness measurements were taken, and was used for analysis.
Refractions used in this study were those refractions
used as a basis for planning the patient's refractive surgery
correction. These input refraction variables were determined
by 1 investigator (P.S.H.) based on 2 manifest refractions
performed on different dates and at least 1 cycloplegic
refraction and 1 cycloplegic wavefront. Results were analyzed
by graphing age versus CCT, and age versus k readings of each of the right eye and that of the left eye .

**Group Statistics**

| | Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| PACHY (CCT) R | Male | 40 | 519.83 | 40.573 | 6.415 |
| | Female | 58 | 541.53 | 35.009 | 4.597 |
| PACHY (CCT) L | Male | 41 | 517.59 | 37.690 | 5.886 |
| | Female | 56 | 538.41 | 35.651 | 4.764 |
| K1 R | Male | 40 | 42.11000 | 1.958388 | .309648 |
| | Female | 58 | 43.18621 | 1.531935 | .201153 |
| K1 L | Male | 40 | 43.57750 | 1.910227 | .302033 |
| | Female | 58 | 44.77759 | 1.734282 | .227722 |
| K2 R | Male | 41 | 41.9122 | 2.25147 | .35162 |
| | Female | 56 | 43.2839 | 1.65527 | .22119 |
| K2 L | Male | 41 | 43.4220 | 2.48993 | .38886 |
| | Female | 56 | 44.7804 | 1.59230 | .21278 |

Table shows the group statistics of the patients with their K readings and CCT for each of them according to their gender

## Results:

According to our results

There is no significant difference between age with any of the variables K1,K2 right eye and K1 , K2 left eye

There is no significant difference between age and the CCT of the right eyes and the left eyes

No significant difference between the CCT of the right eye from that of the left eye

This table shows the paired samples t test for comparison between the age in one side and the other parameters in the other side these parameters are CCT right eye, CCT left eye ,K1 right eye, K2 right eye, K1 left eye, K2 left eye

Paired Samples Correlations

| | | N | Correlation | Sig. |
|---|---|---|---|---|
| Pair 1 | age/years & PACHY R | 98 | .005 | .962 |
| Pair 2 | age/years & PACHY L | 97 | -.002- | .983 |
| Pair 3 | age/years & K1 R | 98 | .023 | .823 |
| Pair 4 | age/years & K2 R | 97 | -.039- | .706 |
| Pair 5 | age/years & K1L | 98 | -.025- | .804 |
| Pair 6 | age/years & K2 L | 97 | -.090- | .379 |

The above table shows that there is no significant difference between the age and the CCT in right eye and left eye, also there is no significant difference between the age and the kratometry readings i.e when the age become older there is no change in the CCT and the keratometry readings

This table shows the comparison correlation between the keratometry readings of the right eye (K1,K2), and the keratometry readings of the left eye and the CCT of the right eye and the CCT of the left eye

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 95% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | K1 R - K2 R | -.061702- | .461206 | .047570 | -.156166- | .032762 | -1.297- | 93 | .198 |
| Pair 2 | K1L - K2 L | -.014894- | .487027 | .050233 | -.114646- | .084859 | -.296- | 93 | .768 |
| Pair 3 | PACHY R - PACHY L | 2.851 | 11.055 | 1.140 | .587 | 5.115 | 2.500 | 93 | .014 |

In the table above I correlate between the CCT of the right eye with the CCT of the left eye and it shows no significant difference between them.

Also I correlate between the K1 and the K2 of the right eye and between the K1 and the K2 of the left eye and also shows no significant difference between them and lastly I correlate between the CCT of the right eye with the CCT of the left eye and also shows no significant difference between them

## Conclusions:

This study defines the CCT in a sample population of patients undergoing refractive surgery. In this population, age and refraction did not affect CCT. And this point lets us go more in doing refractive surgery for any age after 18 years with no age limits.

The non significant difference between the CCT of the right and left eyes of those patients reflect the similarity which were revealed in those patients who were fit for surgical correction by eximer laser and this result is very important to compare the CCT values of the two eyes prior any refractive surgery to avoid possible form frost keratoconus

The majority of the thinnest corneal points were located in the inferior temporal quadrant, and the pupillary center was located in the superior region of the cornea; both differed substantially from the corneal vertex. The CT increased gradually from the center to the periphery. Age, gender, and laterality correlated with some indexes.(9)

The K reading dissimilarity or discrepancy between the K1 and the K2 readings is a very important flag to annotice for the possibility of abnormal corneal topography map that may be related to early keratoconus Keratometric readings are more reproducible than topographic data both for normal and postkeratoplasty corneas.(10)

## Abbreviations

KM keratometry
SE spherical equivalent
K keratometry reading
CR corneal radius of curvature
CCT central corneal thickness
Um micrometer

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