

A study on changes in the central corneal thickness among pregnant mothers in south India

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Abstract

Introduction: Changes in every organ system during pregnancy is noted, even though pregnancy is said to be physiological. The changes can be physiological or pathological. The physiology of pregnancy is a curious issue for specialists from different branches of medicine. Our study was done to know the changes in the central corneal thickness during un complicated pregnancy.

Aim and Objectives: The aim is to study the changes in the central corneal thickness during pregnancy.

Materials and Methods: 80 eyes from 40 pregnant females with no other systemic or pregnancy related comorbidities were examined and the central corneal thickness was measured. Ultrasonic contact pachymetry was used to find out the central corneal thickness.

Results: An increase in the central corneal thickness was found among the study population which was statistically significant. Very thick cornea more than 600 microns, was found in mothers in third trimester of pregnancy.

Conclusions: The changes during pregnancy that are physiological in eyes are usually asymptomatic and transient. This change is only because of the hormonal influence and hence is expected to return to normal after delivery. But, the knowledge on these changes will help the patient when needed.

Central corneal thickness was found to be increased in 62 eyes in this study population.

Keywords: Central corneal thickness, Hormonal influence, Pregnancy, Pachymetry.

Introduction

Pregnancy is a physiologic process that every female loves to undergo; it is a pleasure of being a mother and carrying a little one inside. Ocular changes in eyes and other systems during pregnancy can be physiological or pathological or as a modification of pre-existing condition.

Physiological changes in eyes are increased corneal curvature, decline in corneal sensitivity, increase in corneal curvature, insufficiency in accommodation, fall in intraocular pressure, contact lens intolerance and dry eyes.^{1,4} Ocular adnexal changes such as cholasma, spider angiomas, ptosis and asymptomatic field defects are also found during pregnancy. Changes in eyes are transient in majority of individuals and they are harmless. These changes are more marked during the last trimester of pregnancy.^{1,7} These changes are not permanent and return to normal after delivery and or after lactation period.

The hormones that causes fluid retention¹ are mainly estrogen and aldosterone, Due to excessive resorption of sodium from renal tubules. This excessive reabsorption of sodium and fluid retention are the reason for the increase in central corneal thickness during pregnancy, this change is more marked during the third trimester. The fluid retention in the eye may manifest as fluid inside the layers of cornea leading on to steepening of curvature of cornea which in turn will produce myopic shift in refraction. Normal central corneal thickness is between 540-560 microns.^{8,10} The corneal thickness of 565 or more is said to be thicker cornea. Very thick cornea will have 600 microns or more in central corneal thickness. Central corneal thickness is an important parameter that is used with Goldman applanation

tonometer. Knowledge on central corneal thickness is of important in the assessment of intra ocular pressure.

The central corneal thickness is directly related to the pinging function of the corneal endothelium and it can be measured indirectly by pachymetry. Thicker corneas are associated with higher intra ocular pressures due to increase in resistance to indentation, it also has a great role in refractive surgeries. Central corneal thickness is not constant but was found that it varies. In our study we documented the changes in the central corneal thickness during pregnancy. These changes are due to hormonal impact on the central corneal thickness.

Aim

The aim of the study is to evaluate the changes in the central corneal thickness during pregnancy among the study population.

Objectives

To study the changes in the central corneal thickness during pregnancy.

Inclusion Criteria

Pregnant mothers in second and third trimester of pregnancy were included with prior consent.

Exclusion Criteria

Pregnant mothers with refractive error, eye injuries in the past, other ocular comorbidities and other systemic diseases were exclude since these comorbid conditions could have an influence on the central corneal thickness.

Materials and Methods

Pregnant mothers in their second and third trimester with no ocular and systemic diseases were included in the study. All participant underwent a standardized interview and clinical examination at the out patient department of ophthalmology. The acuity of vision for distance was checked with Snellen's chart after obtaining a detailed history from the patient. The procedure was explained to the mothers in detail and proper consent was obtained.

Corneal pachymetry is used to measuring the thickness of cornea, pachymeter is a device used to measure the central corneal thickness. It is done using either ultrasonic or optical methods. Ultrasonic pachymeters provide the central corneal thickness in micrometers and the same is displayed to the user. It is the most commonly used method and also the gold standard method in measuring the central corneal thickness of eyes.

An average thickness of cornea is 540-560 microns thick. Cornea is said to be thick if it is more than or equal to 565 microns thickness. A very thick cornea has thickness greater than 600 microns. The process is quick, easy and painless. The most common cause of increase in central corneal thickness is mainly due to fluid inside the corneal layers. Corneal endothelium is mainly responsible in preventing the water from entering the cornea. So the value of the central corneal thickness is important when in functional and morphologic evaluation of cornea.

Topical propracain is instilled on the eyes that are to be examined and the thickness in the center of cornea was measured. The central corneal thickness measurement was taken by the same observer throughout the study to avoid observer discrepancies. The same pachymetry machine was used to avoid intra and inter test discrepancies.

Participants were asked to be seated during examination and topical propracaine eye drop instilled. The center of cornea was touched gently with the pachymeter probe tip. Pacymeter probe is held perpendicular to the apex of cornea. Five readings were taken, the mean value of that five consecutive measurements was taken as the central corneal thickness of that particular eye.

The same procedure was carried out on both eyes.

Slit lamp examination of anterior segment was carried out. Detailed fundus examination was done.

Results

Age Group among the Study Population

In this study, nineteen mothers belong to 26-30 years of age and sixteen mothers belong to 20-25 years of age. Only five mothers were more than thirty years in age.

1. 20-25 years: 16 mothers
2. 26-30 years: 19 mothers
3. >30 years: 5 mothers

Parity

Twenty six mothers were primiparous during the study and fourteen mothers were multiparous having one or more live child.

1. Primiparity: 26 mothers
2. One or more than one live child: 14 mothers

Month of Gestational age at the Time of Examination

Mothers of sixty eyes of the study population were in the third trimester of pregnancy during the study period. Ten mothers were in second trimester during the study period.

1. Second trimester-10 mothers
2. Third trimester: 30 mothers

Central Corneal Thickness

1. 540-560: 18 Eyes
2. 561-570: 14 Eyes
3. 571-580: 16 Eyes
4. 581-590: 12 Eyes
5. 591-600: 12 Eyes
6. 601-610: 4Eyes
7. 611-640: 4 Eyes

In our study the difference in the central corneal thickness between eyes is 5-10 microns.

Increase in the central corneal thickness was observed in 62 (77.5%) eyes of 80 eyes in this study. The results suggest that Hormones in pregnancy may have an influence on the changes in corneal thickness during pregnancy. The central corneal thickness was very thick, more than 600 microns in eight eyes. This very high thickness was found in mothers in the third trimester^{1,5,6} of pregnancy. We found that there was a significant increase in thickness of cornea in pregnancy especially in the third trimester of pregnancy.

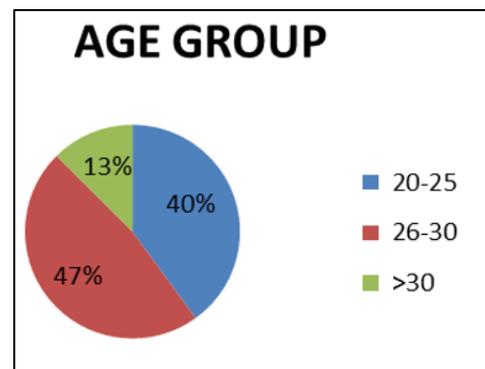


Fig. 1: Chart showing the age distribution among study population

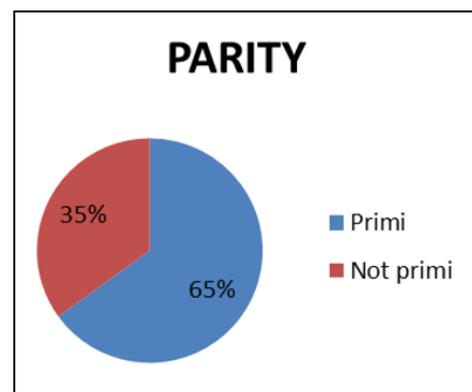


Fig. 2: Showing parity among the study population

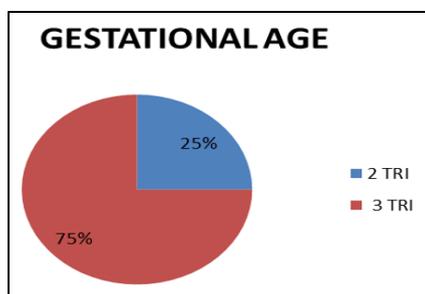


Fig. 3: Trimester of pregnancy at presentation

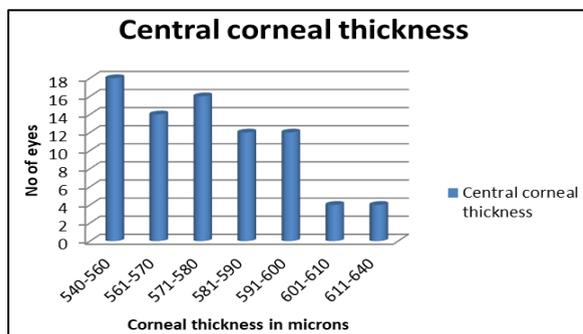


Fig. 4: Central corneal thickness in microns among the study group

Discussion

The study population were in 20-30(35 mothers) years of age, only 5 mothers were more than 30 years of age. 75% of mothers were in third trimester of gestation. The visual acuity was 6/6 in 37 mothers, 6/6p-6/9 in 3 mothers.² No anterior segment abnormality was found in the study population during the study period. No posterior segment pathology was found in all mothers in the study group. 65% of study population were primi and 35% were multigravida in this study during the study period.

Among the study population, 62(77.5%) eyes of 31 mothers showed increase in the central corneal thickness which is significant.^{1,9} This increase in the central corneal thickness in pregnancy with no ocular or systemic abnormality is probably due to hormonal influence and the increase is marked in the third trimester because of increased hormones that have an influence on central corneal thickness.

Increase in the central corneal thickness in pregnancy should be checked to find out the changes to assess the physiological as well as pathological changes which can get worsen the preexisting conditions. So it is advised that such changes to be registered and to be followed up in the post partem period. Routine monitoring of this parameter will be helpful to manage glaucoma patients during their pregnancy period. So ophthalmological examinations should be included in antenatal checkup for detecting the ocular changes in pregnancy.

Statistical Data

One sample t-Test was done. This test compares the mean of sample data to a known value.

Normal central corneal thickness is between 540-560 microns. In this study, there was increase in central corneal thickness in 62 eyes.

Sample mean(x) = 575.45

Hypothesised mean (h) = 550

Standard deviation = 10

Degree of freedom = 79

t-statistic = 22.76317201

p value is <0.00001, The result is significant at P <0.01. Hence the test result is very significant.

Conclusion

In the study group there was increase in central corneal thickness in 62 eyes (77.5%). The knowledge of the physiological changes during pregnancy is important to take necessary action whenever it is needed. So ophthalmological examinations should be included in antenatal checkup for detecting the ocular changes in pregnancy.

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Conflict of Interest: None.

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