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Effect of POAG & PACG on CCT & IOP

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ABSTRACT

Purpose: "Central corneal thickness (CCT)" and Intra ocular pressure (IOP) analyze the effect on "primary open angle glaucoma (POAG) and primary angle closure glaucoma (PACG)" and to correlate the effect of POAG and PACG on IOP and CCT.research is very much important for the public health and we can give the less time consuming diagnostic point of thinking for easily diffrenciating the primarry angle closure glaucoma from the primary open angle glaucoma and the diagnosis can be made easily on the less point to think over glaucoma.

Methods: In this prospective study we recorded the "central corneal thickness" and IOP on PACG and POAG patients with the help of applanation tonometry and pachymetry. CCT and IOP of the POAG and PACG patients compare, IOP taken between 9 AM to 11 AM.

Results: Total patients in our study were 40 patients; in this20 patients were of POAG and 20 patients of PACG. Mean age of males was 54.5 years and female was 47.0 years. CCT was thicker in PACG eyes and thinner in POAG eyes. In PACG females were more affected and in POAG males were more affected.A total of 40 patients including 21 male and 19 females subjects. The mean age of males was 54.5 years and of females was 47.0 years age group of (50 to 60 more affected by PACG, and 40-50 age group patients more affected by POAG). In PACG females were more affected (14 out of 19) and in POAG males were more affected (15 out of 21) in our study we consider CCT 510-540 µm in thinning central corneal thickness, 540 to 560 µm normal CCT and 560 -600 µm central corneal thickness consider thick and more than >600 µm central corneal thickness more thick.

Conclusion: PACG eyes had raised IOP in comparison to POAG eyes. PACG eyes had thicker central corneal thickness as compared to POAG.in primary angle closure glaucoma the cct readings will be less then normal and IOP readings will be high but comparitively the in open angle glaucoma both cct and IOP would would be normal

Keywords: Primary Open-Angle Glaucoma (POAG), Primary Angle-Closure Glaucoma (PACG), Central Corneal Thickness (CCT), Intraocular Pressure (IOP), Pachymetry and Applanation Tonometry

INTRODUCTION:

By 2020, there will be 58.6 million cases of Primary Angle Open Angle Glaucoma (POAG). In 2020, about 5.9 million people will be bilaterally blind due to POAG, and an additional 21 million will be affected by primary angle closure glaucoma. However half of glaucoma induced blindness will be due to PACG.

For glaucoma intra ocular pressure (IOP) is the key risk factor. IOP'S overestimation and underestimation in patients with glaucoma significantly impact on treatment and its prognosis. GAT (Goldman applanation tonometry) is the standard measurement of IOP.

In patients with "POAG and PACG", the impact of "CCT on IOP measurements using GAT" has been investigated. CCT has also been identified as a risk factor for POAG disease. Few studies have compared IOP and CCT in patients with POAG and PACG; the current study's goal was to determine how "PACG and POAG patients" affected IOP and CCT.

CCT is believed to influence the intra ocular pressure measured through the cornea with an overestimation in thicker cornea and underestimation in thinner cornea. The progression and development of glaucoma are linked to the presence of the CCT. "Primary angle closure glaucoma" is the most prevalent kind of glaucoma in the Sitapur region, and there is a dearth of information on differences in CCT.

LITERATURE REVIEW

1.Alexadar CDay, David Mucbin, Tin Aung, Gus Guzzard, Rabat Husain were studied East Asian people with glaucoma for central corneal thickness. This study was a nested case-control analysis using 1090 patients from an eye disease population survey conducted in Singapore and 243 participants from a clinical trial for glaucoma surgery at a hospital in Singapore. The earlier finding that thinner corneas could be independently linked to POAG or PACG was not supported by the research. Future research examining "CCT as an independent risk factor for glaucoma diagnosis" should consider the considerable associations between age and IOP and CCT.

2. Sasan Moghini, MD Hamidreza, MD hesam, Torani, Hasemiyan, MD Hyder Amini. Open angle glaucoma and Central corneal thickness were studied. From March 2005 to May 2008, they examined "the records of patients with POAG or PACG" who were sent to the glaucoma clinic at Farabi Eye Hospital in Tehran, Iran. As controls, a group of people without glaucoma was chosen from the general eye clinic. A history of ocular trauma, intraocular laser or surgery, any systemic disease that could affect CCT, moderate to severe cataract, IOP greater than 25 mmHg on the day of "CCT measurement, chronic uveitiscentral corneal opacity or scarring, corneal oedema', and a history of refractive surgery or penetrating keratoplasty were among the exclusion criteria. In Iranian individuals, they discovered that PACG eyes exhibited thicker CCT than POAG and normal, healthy eyes. In eyes with both POAG and PACG, there was an inverse relationship between the disease's severity and CCT.

3.Sana' Muhsen et al conducted a cross-sectional study to examine "central corneal thickness in a Jordanian population" and its correlation with various forms of glaucoma. Our participants were divided into four principal groups: "pseudoexfoliative glaucoma (PXFG), primary angle-closure glaucoma (PACG), primary open-angle glaucoma (POAG)", and a control group. Each participant's "demographics, intraocular pressure (IOP), cup to disc ratio (CDR), visual field mean deviation (MD) and pattern standard deviation (PSD), CCT, and retinal nerve fibre layer (RNFL) thickness" were recorded. Additionally, it was shown that PACG patients of Arabian origin had the thinnest CCT when compared to POAG and PXFG patients with other forms of glaucoma. We showed that more advanced glaucomatous optic neuropathy is likely to occur in glaucomatous eyes with thinner corneas. Our findings highlight how crucial it is to consider ethnicity while managing glaucoma.

METHODOLOGY

This prospective study was conducted in the glaucoma clinic of "Sitapur Eye Hospital, Sitapur, Uttar Pradesh, India", 261001, from March 2021 to July 2021. 40 patients (both male & female) of age group 30 to 70 years of age were taken study. Every participant in the research gave their informed verbal permission.

All patients between the ages of 30 and 70 who had recently been diagnosed with PACG and POAG met the inclusion criteria.

Previous "eye disease, any ocular surgery, and head and ocular trauma" were exclusion criteria.

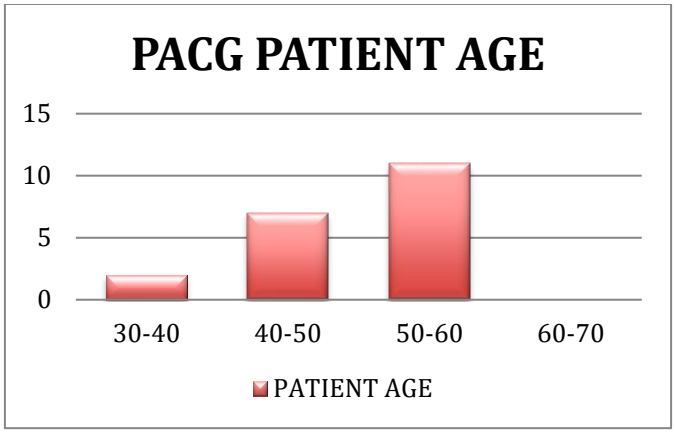
We collected demographic data from the patients (age, gender, medical record number, employment), conducted a thorough medical history, measured their visual acuity with Snellen's visual acuity chart, and tested their near vision with test Roman type. After that external eye examination was done using slit lamp biomicroscope. CCT using pachymetre () and IOP measurement using Goldman Applation Tonometer after applying anesthesia was measured. "Central corneal thickness" was measured during the day (between 9 AM to 12 PM) by the probe of the ultrasound pachymeter perpendicularly touched to the centre of cornea and five measurements were recorded and average center corneal thickness we took in this study. "Central corneal thickness and intraocular pressure in POAG & PACG" were adjusted according to sex, age and disease severity.

RESULTS:

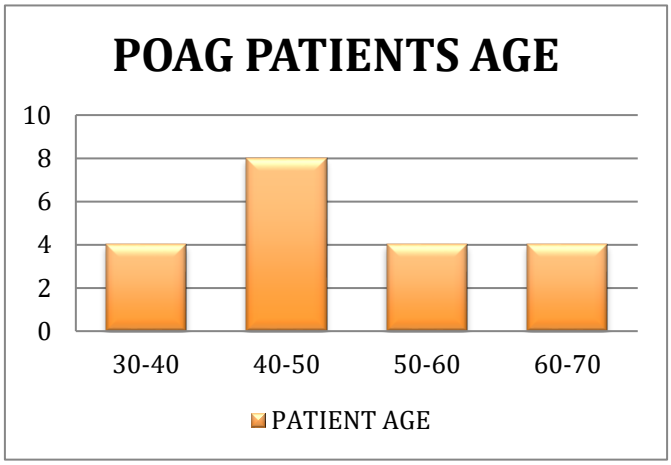
There were a total of 40 patients, with 21 male and 19 female participants. The mean age of males was 54.5 years and of females was 47.0 years age group of (50 to 60 more affected by PACG, and 40-50 age group patients more affected by POAG). In PACG females were more affected (14 out of 19) and in POAG males were more affected (15 out of 21) in our study we consider CCT 510-540 µm in thinning central corneal thickness , 540 to 560 µm normal CCT and 560 -600 µm central corneal thickness consider thick and more than >600 µm central corneal thickness more thick . In this we got thick cornea in 10 patients (560-600 µm) out of 20 patients. In POAG 11 patients central corneal thickness were very thin (510 – 540 µm) 55% out of 20 patients. 25% patient's "central corneal thickness" was within normal range (540 - 560 µm). 3 patients (15%) were thick cornea and 1 patient had thicker cornea (>600 µm) 5%.

CCT values of PACG patients

PACG	PACG	POAG	POAG
MALE	6	MALE	15
FEMALE	14	FEMALE	5



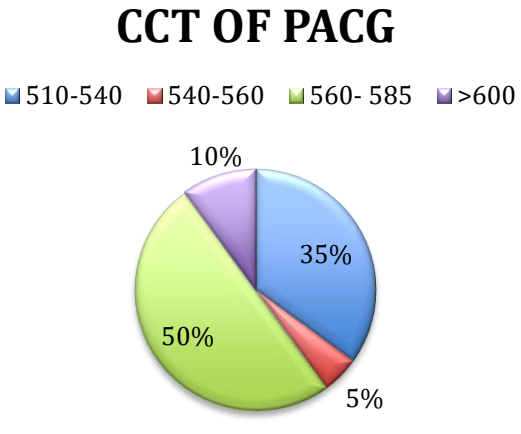
PACG PATIENT AGE



POAG PATIENTS AGE

CCT values of POAG patients

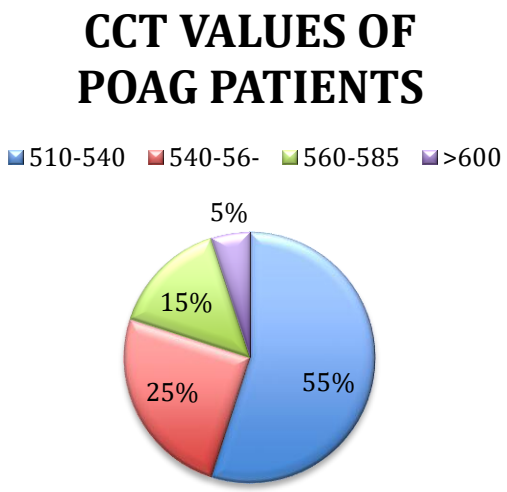
CCT RANGE	PATIENTS
510 - 540	7
540 - 560	1
560 - 600	10
>600	2



CCT OF PACG

In PACG, IOP values as follows –

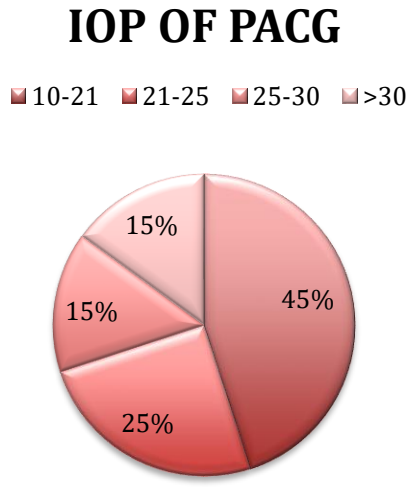
CCT RANGE	PATIENTS
510 - 540	11
540 - 560	5
560 - 600	3
>600	1



CCT VALUES OF POAG PATIENTS

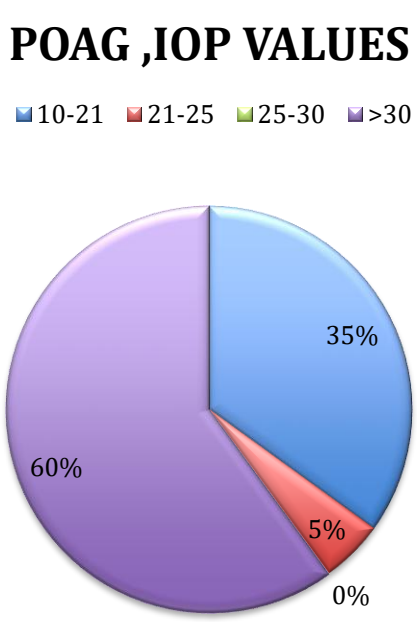
In POAG, IOP values were as follows

PACG IOP RANGE	R/E
10- 21	9
21- 25	5
25-30	3
>30	3



IOP OF PACG

POAG IOP RANGE	R/E
10- 21	7
21- 25	1
25-30	0
>30	12



POAG ,IOP VALUES

DISCUSSION -

Primary open angle glaucoma (POAG) is about to reach 58.6 million by 2020 word wide. In 2020, about 5.9 million people will be bilaterally blind due to POAG, and an additional 21 million will be affected by primary angle closure glaucoma. However half of glaucoma induced blindness will be due to PACG.

The effect of CCT on IOP measurements using GAT has been studied in patients with POAG and PACG. CCT is also found a risk factor for the disease of POAG. The goal of the current study was to determine the impact of "PACG and POAG patients on IOP and CCT", as there are few studies that evaluate these parameters in patients with POAG and PACG.

In this research it is found that “central corneal thickness” in PACG was 560 - 585 um which was found about 528 um in the the related research work performed in IRAN and a great change in “the IOP values” in the POAG about 21-25 mmHg. A lack of consensus exists regarding the influence of gender on CCT.

In a study done by Sasan Moghimi et al it was found that Mean CCT values were 531.7 ± 37.3, 545.5 ± 46.1, and 531.0 ± 38.3 microns (μ) in eyes with POAG, PACG and controls,respectively. Even after adjusting for gender and age, CCT was substantially thicker in "the PACG group (P = 0.03)". In the POAG group, CCT decreased with age (β = -0.57, P = 0.01), whereas in the PACG group, there was no correlation between age and CCT (β = -0.19, P = 0.65). They observed a non-significant difference in CCT between male and female subjects in both POAG (535.1 ± 39.2 μm in female vs 528.8 ± 35.5 μm in male subjects) and PACG groups (550.4 ± 45.6 μm in female vs. 533.3 ± 45.9 μm in male subjects). CCT in female participants was non-significantly thicker than male patients in both “glaucoma groups even after adjusting for age” (ANCOVA, P = 0.30 and P = 0.09 for the POAG and PACG groups respectively). “Univariate analysis” demonstrated that “disease severity (MD)” was significantly and inversely correlated with CCT in both POAG and PACG groups [r = 0.26, P = 0.001 and r = 0.24, P = 0.02,respectively, Figure 2]. After adjusting for age and sex, multivariate analysis revealed that MD was substantially linked with CCT in both "the POAG (β = 1.89, P = 0.02) and PACG (β = 1.38, P = 0.04) groups". Even after controlling for age and gender, CCT was substantially thicker in "the PACG group (P = 0.03)". There are some studies on CCT in PACG reporting no difference in CCT between PACG and controls. However, the limited sample size in these research is a problem. Two studies investigated CCT in Asian populations and reported no difference in CCT between various glaucoma subtypes. Regarding the impact of gender on CCT, opinions are divided. While some studies have found a somewhat thicker CCT in male participants, others have suggested that female gender is linked to a thicker cornea. However, the limited sample size in these research is a problem. The Beijing Eye Study reported higher CCT in male subjects in both the glaucomatous and normal populations. Another study reported a similar association for subjects with “normal tension glaucoma (NTG)”. Although there was a trend for thicker CCT in females with PACG (P = 0.09 after adjusting for age), which may account for the increased risk of PACG among women, there was no significant difference in CCT between male and female individuals in any of the glaucoma groups in this investigation. The “correlation between CCT and age” in normal population has been studied well before. Most of these studies have revealed an inverse “correlation between CCT and age” (a decrease of 3–7 μm in CCT per decade of older age). A meta-analysis by Doughty et al reported a reverse relationship between age and corneal thickness only in non-white populations. The inverse “correlation between CCT and age” in our Middle Eastern subjects is consistent with previous literature. Although we found a significant decrease in CCT with increase in age in our POAG cases, the relationship was not significant in PACG eyes.

CONCLUSION

In this prospective study of 40 newly diagnosed glaucoma patients (20 POAG and 20 PACG) from Sitapur, central corneal thickness and intraocular pressure differed between the two glaucoma types. PACG was commoner in females and in the 50–60 year group, whereas POAG was commoner in males and in the 40–50 year group. Corneas were thicker in PACG, with 12 of 20 eyes measuring above 560 µm, while thinner corneas predominated in POAG, with 11 of 20 eyes measuring 510–540 µm. IOP was higher in POAG: 12 of 20 POAG patients had IOP above 30 mmHg, compared with only 3 of 20 PACG patients, and 9 of 20 PACG patients had IOP within the 10–21 mmHg range. Thus, thicker CCT was associated with PACG and thinner CCT with POAG. Because thinner corneas tend to underestimate applanation IOP, the true pressure in POAG eyes may be even higher, so CCT should be measured in every glaucoma patient to interpret IOP correctly. However, the small sample, single-centre design, absence of a control group and lack of statistical testing limit these findings. Sex distribution also differed markedly between groups, which may confound the comparison. The results should be confirmed in larger studies.

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