To Evaluate Optic Nerve Head Changes In Patients With Primary Open Angle Glaucoma

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ABSTRACT
The early discovery of optic nerve head changes via careful assessment prompts initial finding and the board of essential open point glaucoma. The current examination was attempted to break down to the optic nerve head in patients of open point glaucoma regarding visual field defects.110 eyes of 60 patients were concentrated in this cross-sectional investigation. The mean age of the patients was 58.26 ± 10.44 years, with 30 males and 30 females. 15% of the patients were suffering from hypertension. The mean IOP among the eyes was 18.63 ± 4.17 mm Hg. The mean vertical C/D ratio was 0.61 ± 0.12. 89.09% of patients had a medium disc size. The R/D ratio among patients showed that majority of eyes having RD ratio of 0.01-0.1 (30.91%). HPA grades showed that 32.72% had severe visual field defects. 97.30% of eyes had a contiguous visual loss as compared to noncontiguous (2.70%). The nasal field was mostly affected by 51.35%. DDLS has a stronger correlation with Mean Defect than Vertical C/D ratio and with HPA classification than the Vertical C/D ratio. DDLS to be a simple, brisk, modest and precise strategy to record ONH harm. It seems, by all accounts, to be better than the C/D proportion for optic plate assessment.

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INTRODUCTION
The idea of glaucoma has developed over the most recent 100 years and still stays uncertain and subject to specialized capabilities. Today the term doesn’t allude to a solitary ailment, but instead to a gathering of ailments, that contrast in their clinical introduction, pathophysiology and treatment. These infections are gathered because they share individual highlights, incorporate measuring and decay of the optic nerve head, which has chaperon visual field misfortune and is now and again identified with increment in IOP (Drance, 1997). Glaucoma shows a dynamic optic neuropathy with visual field misfortune and trademark fundamental changes, including diminishing of the retinal fibre layer and ONH changes. IOP doesn't characterize glaucoma, and numerous patients with glaucoma have IOP estimations that can be found in people without glaucoma. Based on the accessible information, it is assessed that there are roughly 11.2 million people created 40 years and dynamically arranged with glaucoma in India (George et al., 2010). Acute open point glaucoma is surveyed to affect 6.48 million people. A large portion of those with the disease is undetected, and there exist basic difficulties in perceiving and remunerating them.

Glaucoma is the subsequent driving reason for visual deficiency worldwide and is likewise an under-analyzed condition. Improved techniques
to analyze and oversee glaucoma are desperately needed (Quigley, 2006). Since the weakness of visual capacity in late stages is irreversible, it is urgent to screen the degree of optic circle harm on clinical assessment, deformity of RNFL and visual field deserts (VFD) for early determination and the executives of glaucoma.

Ganglion cell passing that causes a trademark optic nerve change - to be specific, dynamic narrowing or loss of the neuroretinal edge, especially in the vertical shafts of the plate, is the sign of glaucoma (Kirsch and Anderson, 2018).

The Cup/Disk proportion, which was presented by Armaly in 1969, and has been utilized as a standard strategy to assess the optic nerve head (Armaly and Sayegh, 1969). Be that as it may, C/D proportion experiences head weaknesses. It is the individual eyewitness' abstract appraisal of the cup to plate proportion which may change starting with one spectator then onto the next.

A few agents called attention to that the size of the optic cup was identified with the size of the optical disc (Jonas et al., 1989). They revealed that little circles have little cups, fewer nerve strands and litter C/D proportions which may prompt small plates with low C/D proportion to be named typical, regardless of whether they have glaucoma or not.

The benefits of such a framework are that it thinks about the circle size and it centres around the neuroretinal edge tissue diminishing. In all pieces of the world, glaucoma is a significant general medical issue and a reason for the personal catastrophe. It is the second most frequent reason for visual impairment and the most typical driving reason for hopeless visual deficiency worldwide (Fraser et al., 2001).

Glaucoma is a malady described by raised IOP, retinal nerve fibre harm and optic plate decay prompting visual field absconds. Optic nerve head evaluation is a pivotal piece of clinical assessment in glaucoma. Attributable to huge inconstancy in ONH highlights among healthy subjects, the recognizable proof of glaucomatous variation from the norm is very testing, especially in beginning times of the sickness. In any case, it has been demonstrated that auxiliary glaucomatous irregularities go before the presence of useful variation from the norm, further underscoring the significance of plate assessment (Sommer et al., 1979).

**Methods**

In this randomized study, patients analyzed to have essential open edge glaucoma and on treatment just as recently analyzed patients of essential open point glaucoma were selected.

On the whole, 120 eyes of 60 patients have tried out the examination. Ten eyes were rejected because of cutting edge glaucoma and extreme visual misfortune. Visual field assessment was impractical in these cases. The diagnosis of primary open-angle glaucoma was made based on a normal angle, which was confirmed by gonioscopy plus two of the following three criteria

1) Intraocular pressure of >21mmHg
2) Glaucomatous optic nerve head changes
3) Visual field changes suggestive of glaucoma

Intraocular pressure was recorded in each patient with Goldmann applanation tonometer. Visual field assessment was done with an Octopus 300 border with a standard 30-2 program for glaucoma.

Enlarged fundus assessment and circle evaluation was finished utilizing an immediate ophthalmoscope and cut light assessment using a + 78D focal point. Optic plate photos were taken with a Topcon cut light camera.

**Exclusion criteria**

Disorders of the optic nerve, which also produce visual field findings, nerve fibre layer loss and disc appearance that can mimic glaucoma.

**Optic Disc Evaluation**

Optic nerve head changes were staged as per the Disc Damage Likelihood Scale.

Vertical plate distance across was estimated utilizing a Volk 78D focal point. The cut pillar was centred around the plate and length of the bar expanded or diminished according to the vertical circle size. The circle size was then perused from the graticule of the cut light.

Estimated circle size was duplicated by a remedy factor of 1.2 according to rules by the European Glaucoma Society.

Cup Disc proportion was evaluated. The neuroretinal edge was assessed for diminishing and scoring. The nearness of circle haemorrhages and beta zone peripapillary decay were inspected. Retinal nerve fibre layer deserts were investigated utilizing red free channel.

Rim to plate proportion was determined by contrasting the spiral width of the neuroretinal edge with that of the circle distance across in a similar hub. Edge territory at which the edge is tightest was noted, and Rim to Disk Ratio determined by then.

**Statistical analysis**
It included the Pearson one-tailed correlation test to explore the correlation between cup: disc ratio, DDLS stage and visual field indices, i.e., Mean Defect (MD) and standard loss variance (sLV).

**Results**

**Distribution of patients according to age**

It was observed that the majority of patients belong to age group 61-70 years (33.33%) followed by age group 41-50 years (26.67%). The mean age of the patients was 58.26 ±10.44 years.

**Distribution of patients according to sex**

In the study among 60 patients, 30 were males, and 30 were females.

**Distribution of patients according to the duration of the disease**

The majority of patients had glaucoma for ≤ 1 year (36.67%), followed by disease 4-6 years (25%). Among the patients, 2 (3.33%) were having disease >12 years.

**Distribution of patients according to the presence of associated systemic illnesses**

Among the 60 patients, 15% shows systemic illness of hypertension and diabetes mellitus with hypertension. In around 4 (6.67%) patients diabetes was seen, and in 37 (61.66%), no systemic illness was found.

**Distribution of patients according to intraocular pressure**

Among 110 eyes of the patients, the majority were having IOP between 16-20 mm of Hg (47.27%). In 32 eyes (29.09%) IOP was >20 mm of Hg.

**Distribution of patients according to CD ratio**

It shows that 30.90% of eyes had a CD ratio Vertical of 0.6, followed by 0.5 in 28.18% eyes.

**Distribution of patients according to Disc size**

The distribution of patient’s eyes according to disc size showed that the majority of eyes 89.09% had medium disc size followed by large (7.27%) and small (3.64%) disc size.

**Distribution of patients according to R:D Ratio**

The distribution of patients eyes according to RD ratio showed that majority of eyes having RD ratio of 0.01-0.1 (30.91%) followed by 0.1-0.19 (28.18%).

**Distribution of patients according to DDLS Grade**

Among 110 eyes DDLS grade 4 was seen in 37.27% eyes followed by grade 3 in 17.27% eyes. DDLS grade 0 and grade 10 was seen in 1 (1.67%) eye each.

The majority of patients eyes had severe visual field defects (32.72%) followed by early visual field defects changes among 23.64% eyes.

**Distribution of DDLS stage according to HPA Grade Visual fields defects**

The distribution of patients’ eyes according to HPA grade visual field defects shows that majority were in DDLS stage 4 (41) and the HPA grade with severe visual field defects (36)

**Distribution according to a region of crossover in confirmed crossover eyes**

The distribution of region of crossover among confirmed crossover eyes shows that 97.30% of eyes had a contiguous visual loss as compared to noncontiguous (2.70%). The nasal field was most affected with 19 eyes followed by nasal with temporal. (10 eyes)

**Distribution according to the location of visual field defects in no crossover eyes**

In the no contiguous crossover eyes, 55.56% eyes shows superior visual field defect followed by inferior (33.33%). Among 21 no crossover noncontiguous eyes majority of superior field defect was observed (61.90%) as compared to an inferior field (33.33%)

**Correlation between MD and DDLS**

The connection between MD and DDLS grades shows a measurable noteworthy relationship. (P<0.001). The connection shows a negative association with Pearson’s coefficient (r) as -0.71.

**Correlation between MD and vertical CD**

The relationship between MD and Vertical CD Ratio shows a verifiable basic association. (P = 0.003). The association shows direct Pearson’s coefficient (r) as 0.62.

**Correlation of DDLS and HPA**

The association of DDLS and HPA shows a genuine basic relationship. (P<0.001). The association shows direct Pearson’s coefficient (r) as 0.70.

**Correlation of CD ratio and HPA**

The relationship between HPA and Vertical CD extent shows quantifiable ramifications association. (P<0.001). The association shows direct Pearson’s coefficient (r) as 0.61.

**Correlation of DDLS and LV**

The relationship of DDLS and LV shows a quantifiable enormous association. (P<0.001). The association shows straight Pearson’s coefficient (r) as 0.70.

**Correlation of vertical CD ratio and LV**
The association of LV and Vertical CD extent shows the quantifiable colossal relationship. (P<0.001). The association shows direct Pearson’s coefficient (r) as 0.65.

Discussion

In the present study, a majority of patients belong to age group 61-70 years (33.33%) followed by age group 41-50 years (26.67%). The mean age of the patients was 58.26 ±10.44 years. This shows that with increasing age, the percentage of glaucoma also increases. In the study, among 60 patients, 30 were males, and 30 were females. This shows an equal distribution of open-angle glaucoma among both sexes. The duration of the disease shows that, majority of patients having disease ≤ 1 year (36.67%) followed by disease 4-6 years (25%). Among the patients, 2 (3.33%) were having the disease >12 years. The mean age of duration of illness among patients was 4.68 ±3.96 years. Among 60 patients, 9 patients (15%) were suffering from hypertension, and an equal number had diabetes mellitus with hypertension. 6.67% of patients had diabetes, and 37 patients (61.66%) had no systemic illnesses. 39% of the patients examined were suffering from systemic illness. This shows that an increase in blood pressure leads to increased risk of open-angle glaucoma among the patients.

In the present study, among 110 eyes majority were having IOP between 16-20 mm of Hg (47.27%). In 32 eyes (29.09%) IOP was >20 mm of Hg. This shows that raised IOP was present among 29.09% of patients. The mean IOP was 18.63 ±4.17 mm of Hg. A significant number of patients (47.27%), i.e., 52 patients had glaucomatous changes.

The mean Vertical C/D ratio was 0.61 ±0.12. It shows that 30.90% of eyes had a CD ratio Vertical of 0.6, followed by 0.5 in 28.18% eyes. The distribution of patient’s eyes according to disc size showed that the majority of eyes, 89.09% had medium disc size followed by large (7.27%) and small (3.64%) disc sizes.

The findings of our study were comparable with a study by Suresha A.R. et al. (Goldberg, 1981), where the optic disc sizes were in ranges from 1.33 mm to 2.4 mm with average vertical disc size 1.87 mm (SD = 0.26). 11.5% of the patients had disc size <1.5 mm (small), 57.5% of the patients had disc size with 1.5 to 2.0 mm (medium). 31% of patients had more than 2.0 mm disc size (large).

In the present study, the distribution of patients eyes according to RD ratio showed that the majority of eyes having R/D ratio of 0.01-0.1 (30.91%) followed by 0.1-0.19 (28.18%).
tifiable undertone relationship. \( P<0.001 \). The association shows direct Pearson’s coefficient (r) as 0.61. The association coefficient between vertical C/D extent and HPA is lower than that of DDLS with HPA portrayal. These revelations show that DDLS has a more grounded association with HPA gathering than the Vertical C/D extent.

The association of DDLS and LV shows the fundamental relationship. \( P<0.001 \) The association shows straight Pearson’s coefficient (r) as 0.70. The link of LV and Vertical CD extent shows verifiable undertone association. \( P<0.001 \) The association shows straight Pearson’s coefficient (r) as 0.65. Moreover, the examination found that DDLS beat the CDR in envisioning visual field hurt and has been exhibited to be a trustworthy and reproducible procedure for evaluating the proportion of optic nerve hurt realized by glaucoma. This is moreover in simultaneousness (Danesh-Meyer, 2006). It was seen that clinical appraisal using the DDLS had the most significant Area under Curve (AUC= 0.93) farsighted estimation of variables in the parcel of glaucoma patients from healthy patients. The Vertical Cup trailed this to Disk Ratio (AUC=0.89), Visual Field Mean Deviation (AUC=0.86) and Visual Field HPA Score (AUC=0.83).

As such, DDLS has seemed to interface even more personally with visual field records and the HPA orchestrating system which is entirely vital in predicting visual field incident; as such creation, it an excellent instrument for an early finding, watching the development, response to treatment and looking over expectation of open-edge glaucoma.

**CONCLUSIONS**

The study assumed that the DDLS appears to be superior to C/D extent as a clinical method to manage optic circle appraisal. Its intentional estimation of plate size and neuroretinal edge narrowing is sensitive and express at a lower cost diverged from higher techniques for assessments. C/D extent is comprehensively used, and an undeniable important strategy, yet a more cutting-edge and extra DDLS structure may improve glaucomatous optic nerve head appraisal. This will help in early acknowledgement of glaucomatous changes and suitable treatment of the patients.

**Conflict of Interest**

None to disclose.

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