

# A Clinical Study of Effect of Aqueous Out Flow Facility (C-Value) in Different Diabetic Retinopathy Patients Excluding Hypertension and Arteriosclerosis

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**Abstract:** Diabetes mellitus a major cause of blindness and visual disability not only in developing countries but also in developed countries. Its effects on so many ocular manifestations. One of that is outflow facility('C' Value) and IOP. 'C' Value is calculated in DM patients excluded hypertension and arterio sclerosis. Friend enwald nomograms 1955 for above cases by Schiötz tonometer. Normal is 0.28 $\mu$ l/min/mmHg. In DM patient 0.25  $\mu$ l/min/mmHg in relation to without retinopathy 0.24  $\mu$ l/min/mmHg in with retinopathy. **Aim of the study:** Diabetes Mellitus within the last 6decades has emerged as a major cause of blindness and visual disability not only in developing countries but also in developed countries. It is one of the major cause of blindness in the western countries. Diabetes besides other ocular manifestation also effects the outflow facility of aqueous. Diabetics are more prone to have primary open angle glaucoma. The present study was under taken to review the possible relationship between outflow facility of aqueous and Diabetes mellitus. A sample of 100 cases had been taken in randomized manner of known diabetic patients as target population. **Materials and Methods:** The study of 'C' Value outflow facility of aqueous in DM has been carried out in the REH, Kurnool and outside of Hospital and the patients admitted in endocrinology units of GGH, Kurnool for various medical complaints. In present study 100 Diabetic cases have been evaluated for 'C' Value. Hypertensive and Arterio sclerotic patients are excluded in this study.

**Keywords:** Diabetes Mellitus<sup>1</sup>-outflow<sup>2</sup>-c'-value<sup>3</sup>-IOP<sup>4</sup>-schiötz tonometer<sup>5</sup>-gonioscopy<sup>6</sup>-fundoscopy<sup>7</sup>-mean IOP<sup>8</sup>-POAG<sup>9</sup>

## 1. Clinical Study Carried Out as Follows

- 1) 'C' Value using friend enwald nomograms 1955 for the above mentioned 100 cases using Schiötz tonometer.
- 2) Gonioscopy to note the type of angle wide open or closed angle.
- 3) Fundoscopy direct/indirect.
- 4) Tonography by schiötz tonometer.

Particular attention has been paid to co-relate the change in facility of outflow('C' Value/and IOP changes)

## 2. Observations

### 2.1 Estimation of Facility of Aqueous Outflow

Tonography affords one of the most convenient methods of estimation of outflow facility ('c' Value). It was performed by placing the standard Schiötz tonometer (indentation method) on the eye for a period of 4 minutes and recording the progressive indentations of the cornea by the plunger.

The outflow facility is calculated as  $C = \frac{V}{T(Ave. Pt - Po)}$  (Grant's equation)

C= Outflow facility co-Efficient

V=Volume of fluid expressed from eye during tonometry

Po=Base line IOP

Pt=New Higher level IOP after indentation

T=4 minutes

The C value is an expression of the degree to which a change in the IOP will cause a change in the rate of aqueous outflow, which is an indirect expression of the patency of the aqueous outflow system.

The values of these are taken form the pressure volume tables. The observations of this study are based on the findings in 100 patients with diabetes mellitus. Out of the total of 100 cases, 95 were of Maturity onset diabetics (NIDDM) while juvenile onset diabetics (IDDM) constituted only 5 cases.

### 2.2 Outflow Facility ('C'-Value) in Relation to Retinal Status

In the present study, the facility of aqueous outflow ('C'-Value) in relation to the retinal status has been correlated. The facility of aqueous outflow has been decreasing in early stages of diabetic retinopathy, such as mild moderate and severe conditions.

S.No.	Retinal Status	No. of Eyes	Percentage	Mean outflow/Facility (inpi/mini mm.of Hg)
1	Diabetes without retinopathy	25	25	0.25
2	Diabetes with retinopathy	75	75	0.24
	Non- proliferative			
	a) Mild	9	9	0.23
	b) moderate	25	25	0.21
	c) severe	29	29	0.20
	proliferative	6	6	0.29

Volume 8 Issue 2, February 2019

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Standard deviation

$\frac{4pq}{L^2}$

$L^2$

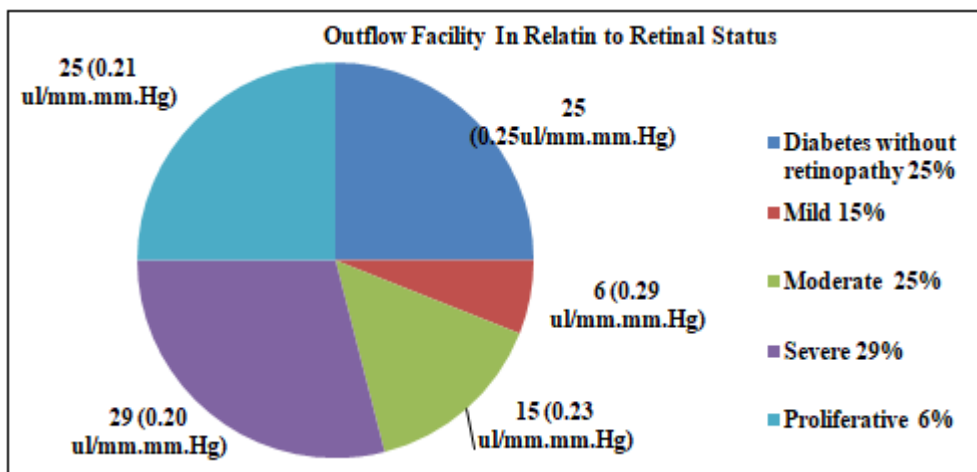
P = Prevalance

Q = 100-P

L = 10% P

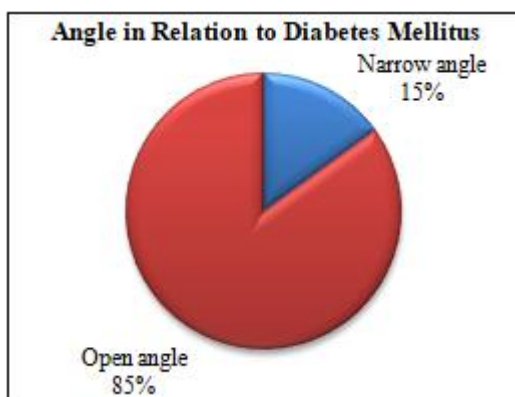
In the study standard deviation is 0.2 μ / min / mm.Hg

The mean facility of aqueous outflow recorded in severe non proliferative diabetic retinopathy is 0.20 microlitres /minute/mm. of Hg. In the advanced stage of retinopathy (proliferative) the outflow facility is increased. The mean facility of aqueous outflow recorded in proliferative diabetic retinopathy is 0.29 microlitres/minute/mm. of Hg.



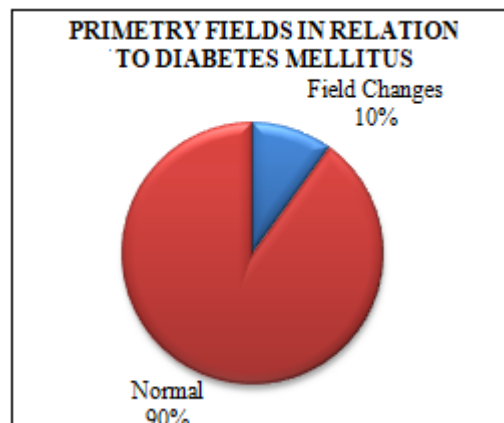
**Gonioscopy**

In all the 100 diabetics surveyed, gonioscopy revealed wide open-angle of the anterior chamber in 85% of the cases and narrow angle is 15% of the cases by using Goldmann three mirror gonioscopic lens.



**Visual Fields**

In hundred cases of diabetes surveyed with Humphrey’s perimetry, 90% of the cases were normal and 10% of the cases with increased IOP more than 22 mm.Hg. revealed field changes such as siedel scotomas, arcuate scotomas and tubular fields.



**3. Discussion**

Diabetes mellitus is very common disease. The present clinical study has been carried out to know the relationship between DM and the outflow facility.

In the study the mean IOP in NIDDM is 20mm.Hg. In juvenile diabetes (IDDM) the mean IOP is lower (18mm.Hg) than the mean IOP in Maturity onset Diabetes than normal average mean IOP.

Thus the finding, clearly indicates the higher mean IOP in diabetes as compared to the non diabetic population

The facility of aqueous out flow in normal persons was 0.28μl/min/mmHg. In the present study the value of outflow facility is 0.25μl/min/mmHg. In diabetics without retinopathy 0.24μl/min/ mmHg. In diabetics with proliferative retinopathy 0.29 μl/min/mmHg.

So it can be concluded that the failure of aqueous outflow is low in diabetic population as compared to normal population.

Gonioscopy study in 100 diabetics showed that there is wide open angle like that of primary open angle glaucoma in 85% of the cases and 15% of them showed narrow angled and few of them even shatters grade-0

#### 4. Conclusion

The present clinical study has been carried out in 100 diabetic patients with regard to 'C' value. The final conclusions draw from such a study on follows:

- 1) Over the age of 40 years both diabetic and glaucoma were found to be the common disorder. The age incidence is same almost in both sexes.
- 2) The aqueous outflow decreased in diabetics over 40 years age as compared to the same age group of normal population.
- 3) The mean IOP (NIDDM) is 21 mmHg.
- 4) Juvenile – 18 mmHg.
- 5) The facility of aqueous outflow in non-proliferative population repeatedly is 0.24  $\mu\text{l}/\text{min}/\text{mmHg}$ . In proliferative retinopathy is 0.29  $\mu\text{l}/\text{min}/\text{mmHg}$ .
- 6) Gonioscopy showed under open angle of the in 85% and 15% of cases with angle closure.
- 7) Low IOP is usually associated with PDR so, a conclusion that high IOP may conform partial protection against the development of PDR.
- 8) The evolutionary stage of diabetic retinopathy and IOP can be correlated. Early diabetic retinopathy cases showed higher tensions than late diabetic retinopathy cases POAG is more in NPDR cases.

#### 5. Summary

In the present study 100 diabetics are examined for 'C' Value. The result of the study has been summarized as follows:

- 1) The 'C' value was low in diabetics compared to normal population
- 2) IOP found to be higher in diabetics than in general population except in patients with proliferative retinopathy.
- 3) Gonioscopy revealed wide open angle in 85%
- 4) The incidence of POAG is of higher incidence in 5<sup>th</sup> or 6<sup>th</sup> decade of aged diabetics.
- 5) There has been decreased outflow and increased IOP both in patients with diabetic retinopathy (NPDR) and in those without retinopathy.
- 6) Visual fields were normal in 90% of cases, where as 10% cases were found to have visual field defects.

#### References

- [1] Sone Hirochito, Okada Y Uklichil, et al – vascular endothelial growth factor level in Aqueous humour of Diabetic patients with Rubeotic Glaucoma – diabetes care 1996 November Vo.19(11)PP 1306 – 1307.
- [2] Rehak J – Neovascular glaucoma and IOP in Diabetes – Acta Univ. Palacki, Olamuc Fac Med. 1992. 133: 71-73.
- [3] Kubota Toshiaki, Tawara Akihikotel – Neovascular tissue in the intra trabecular spaces in eyes with neovascular galaucoma in Diabetes – Br.J.Ph.1996 August Vol.80(8)PP 750-754

- [4] Zohal Mokni I, Nacef L, Lataief I – Study of ocular Manifestations in Diabetes – PMID No: 19213494 indexed for Medicine – Pub Med.
- [5] Jain IS and LuthraCL – Diabetic retinopathy and its relationship with IOP – All India Oph.Society Journal – 1969 – 17 Vol.95- 98.