DISCUSSION
The primary aim of our study was to:

(a) Study the relationship of Intra Ocular Pressure in diabetics and non-diabetic persons and
(b) To study the effect of different stages of diabetic retinopathy on Intra Ocular Pressure.

Furthermore we have also seen the effect of duration of diabetes on the development of retinopathy.

A total of 60 cases were selected of which 17 were normal non-diabetic persons acting as control and the remaining 43 cases were diabetic persons. We had also divided diabetic cases into Juvenile diabetes (Type I diabetes) and maturity onset diabetes (NIDDM) or Type II diabetes.

Detailed clinical examination of each eye was done in all the 43 patients and special emphasis was given to the intra-ocular tension and fundus; grading of retinal status was done by according to Wageners classification. Blood sugar level fasting or random, according to the availability were recorded in all the cases. Based on the observations depicted in tables No. 1 to 2, following inferences were drawn and discussed.
under different headings.

It is evident from Table No. 1 that amongst the study group of cases, the majority of cases 60.4% were males and 39.5% were females while in control group it was 64.7% were males and 35.3% females, this forms male female ratio of 2:1. Table No. 2 reveals that the majority of cases in Juvenile Diabetes were females as compared to maturity onset diabetes in which males were predominating. Duke-Elder describes that female-male ratio is 3:2, and also that women are more liable to develop retinopathy. Proportion of female male ratio with diabetic retinopathy is about 4:3, while in some other studies there is much greater incidence among females; Haman (1958), for e.g. in 183 cases of diabetic retinopathy found 72% females and 28% males. The larger statistics of Portmann and Wiese (1954), Neiding et al. (1952), Janert et al. (1956) and Faber and Billiot (1958), however did not show a difference between the sexes. The reason for the predominance of females in Juvenile (Type 1) diabetes is because of more susceptibility of females to have diabetes, while in MODM, males cut number females probably because they are more conscious about their health (Table No. 3 and 4).
Table No. 5 shows the retinal status of case material. Eyes with retinopathy which forms total of 38 eyes i.e. 45.2% of the total case material is in close agreement with the prior studies viz., Wagener's (1921) found the incidence of 8.3% of diabetic retinopathy among diabetics (Wagener and Wilder 1921), in 1934, the incidence has risen to 17.7% (Wagener et al. 1934) and in 1945 it was 29.6%; Kernurup (1957) found 601 cases of diabetic retinopathy out of 1285 unselected diabetics (47%) and Dalfus (1954) reported 52.4% cases. It therefore follows that the incidence of diabetic retinopathy is on an increase and is expected to have above 50% cases of diabetic retinopathy at present.

As has been broadly classified earlier (Table No.6), amongst the different grades of retinopathy, there were 24 males and 22 females (54.7%) in grade 0 retinopathy, 9 males and 4 females (15.4%) in grade I retinopathy, 10 males and 3 females (15.47%) in grade II, 5 males and 3 females in grade III (9.52%) and 4 males only in grade IV were taken in our study. Christiansson (1960) too found maximum number of cases in grade 0 viz., 44 males and 49 females, 17 males and 19 females in grade I,
in grade II 6 males and 6 females, in grade III 7 males and 4 females and finally 11 males and 8 females in grade IV, showing a decreasing order.

In our study we observed that the diabetic retinopathy develops in diabetic patients in 13.8 year while Christianssons (1951) reported retinopathy to develop on an average 16.7 year of duration; a figure which was in close relation with the studies of Kormarup (1955) Upteen workers in the past had reported that a minium of 3 year period is required to develop any retinopathy (Weitz and Seetham 1935; Wagner 1943; J.S. Friedenwald 1950; Lawrence et al. 1951; Gardner 1953; C. Scott 1953).

To develop proliferative retinopathy, our study showed an average duration of 17.5 years on the other hand, patients with proliferative retinopathy (Christianssons 1960), constitute 17.5% of total case material with an average diabetic duration of 16 year. Kormarup (1955) also had same figures of 16.1 year of diabetic duration to develop proliferative retinopathy.

Another important observation in our study was a decreased duration in grade II and III, and that too in females only. This is 9.33 year in grade II retinopathy,
and 10.7 year in grade III retinopathy. This is because apart from the duration of diabetes, age of the patient etc., it is also the severity of the disease which affects the development of retinopathy. It was found that out of total of 6 juvenile diabetics, 3 had grade II and III retinopathy i.e. 6 eyes (7.17%), and their blood sugar levels were 334 mg% on an average (though duration in years was ten). This observation is in co-relation with C. Donaghan and Drury (1954) who found retinopathy to be more common the more insulin was required to control the diabetes. Melniko also shows that retinopathy occurs earlier and more commonly in severe cases. White and Beetham (1955) however found no relationship at all between frequency of retinopathy and severity of disease (Table No. 7).

MEAN INTRA OCULAR PRESSURE

The fact that mean Intra Ocular Pressure is definitely more in diabetic's, being 18.65±4.2 in maturity onset diabetes and 20.3±2.7 in juvenile diabetes; as when compared to mean Intra Ocular Pressure in normal population (17.3±1.8) has been clearly demonstrated in our study from table No. 8. The value between normal
control and maturity onset diabetics being statistically significant ($P<0.01$) and in juvenile diabetics it is found to be very significant ($P<0.001$).

Moreover, various workers, viz. Salas (1956) and Nealy and Delagour (1967) observed low Intraocular Pressure in diabetics as compared to non-diabetics. Verma and Prasad 1989, like us, have reported, mean Intraocular Pressure in maturity onset diabetes mellitus to be 19.26 mmHg which is higher than normal mean Intraocular Pressure reported in general population i.e., 16.4 mmHg (Becker and Schaffer), while in juvenile diabetics the mean Intraocular Pressure though lower 17.93 mmHg than the mean Intraocular Pressure in NOCM was still, higher than normal average mean Intraocular Pressure.

**Intraocular Pressure in Relation to Retinal Status**

It is evident from Table No. 9 that, total of 46 eyes (54.76%), of diabetics had no retinopathic changes in Fundus and the mean Intraocular Pressure in these is 13.3±3.3 which is definitely more than normal Intraocular Pressure of control group i.e., 17.2±1.8, though values between the two are statically not very significant ($P>0.05$) but still on an average there is a definite difference between the Intraocular Pressure of two groups.
Another important interesting observation of our study was that, as the grade of retinopathy increased, the mean Intra-Ocular Pressure also showed an increasing tendency until at the final stage (grade IV retinopathy) it declined steeply.

In grade I retinopathy, out of 13 eyes (19.47%) mean average Intra-Ocular Pressure is found to be 16.95±2.5. The values when compared with normal control group doesn't statistically show a significant difference (P>0.05) though here also overlooking the P value, we do find a definite increase in mean Intra-Ocular Pressure as when compared to normal control group.

Grade II retinopathy, similarly, following the tradition showed an increase in mean average Intra-Ocular Pressure i.e. 21.66±2.6. Here the values are found to be statistically very significant (P<0.001) and ultimately in grade III retinopathy out of 5 eyes which formed a total of 9.52%, showed 20.35±2.00 of mean Intra-Ocular Pressure which is again when compared to normal control group shows a very significant value (P<0.001).

But above all this the most interesting observation in our study is seen when grade IV retinopathy and its mean Intra-Ocular Pressures are considered, out of 4 eyes (4.76%) of grade IV retinopathy,
the mean Intra Ocular Pressure was 15.27±1.1 which when compared to control group 17.3±1.3, shows quite a good amount of difference. The same values when statistically compared therefore showed a very significant difference (P<0.001).

On comparison of mean Intra Ocular Pressure observed by us in different grades of retinopathies, to that of other workers, we find a similar co-relation was found by Arora and Prasad (1989); who studied a total of 120 patients, out of which 60 were diabetics forming the study group and 60 non-diabetics forming the control group. They found mean Intra-Ocular Pressure in diabetics without retinopathy to be 16.17 mmHg, while in eyes with retinopathy it was 19.99 mmHg (in our study the Intra-Ocular Pressure in diabetics with retinopathy is 19.05 mmHg). Arora and Prasad found significant difference in mean Intra-Ocular Pressure in proliferative retinopathy when compared to normal control group. The value is 15.98 mmHg in grade IV or proliferative retinopathy. In others, like us, they found Intra-Ocular tension of 20.98 mmHg in grade I retinopathy, 21.99 mmHg in grade II retinopathy and 22.18 Schiots tension in grade III retinopathy.
In contrast to our findings, Christianssons (1960) who studied total of 172 diabetic patients though found similar ratio of retinopathy developing in diabetics (45.6% cases) is found in our study being (45.2%), but unlike us, he found a decreasing Schiottz tension as the grade of retinopathy increased viz. 16 mmHg in grade I retinopathy in grade II, the tension decreased to 12.3 mmHg and in grade III 9.5 mmHg. He said that tension further decreased in grade IV and V retinopathies but he didn't give the exact values.

In nutshell, our study amply demonstrates and collaborates the earlier findings, that the mean Intra-Ocular Pressure in diabetics is higher than the pressure in general population and that the pressure rises with the increasing grades of retinopathies. The study has also indicated that as the duration of diabetes is increased, it is directly related to the retinopathic grade, besides other factors affecting it, as the insulin requirement and age group of the patient.

We therefore conclude that the mean Intra-Ocular Pressure in diabetics is more than the mean Intra-Ocular Pressure in non-diabetics and that this Intra-Ocular Pressure increases as the grade of retinopathy increases ultimately showing a downfall at last stage i.e. proliferative retinopathy.