DISCUSSION
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Diabetes mellitus is characterized by sustained hyperglycemia secondary to lack or diminished efficacy of endogenous insulin and is one of the most common diseases in the civilized world.

Each part of visual system is susceptible to the harmful effects of diabetes which range from changing refractive errors to progressive disease of eye itself including cornea, iris, lens, retina optic nerve, extracocular muscles and orbit.

As per review of literature it will be noted that although ocular complications in diabetes are rated high in most of the western countries. Yet there are considerable variations in its incidence as reported by different workers all over the world. In India, very little has been reported on this subject in the past few decades the reason for this appears to the lack of regular ophthalmological survey of diabetic patients.

The cases, were selected randomly from diabetic clinic of Department of medicine and from Ophthalmology department, M.L.B. Medical College, Jhansi.

The present study includes 106 cases, which are mostly males 64 (60.37%) and rest females 42 (39.62%), these may be due to more prevalence given to man.
over women in Bundelkhand region in every field from education to even sickness and awareness of Health. Maximum number of patients were from the age group of 41-60 years (52.89%) followed by 22.64% in age group of 21-40 years and 20.75% in 61 and above age groups.

Most of the patients belonged to urban areas, which may be due to less general awareness and ignorance among rural people of Bundelkhand region.

Diabetic patients were divided into two major groups according to type of diabetes mellitus. Type-I insulin dependent diabetes or Juvenile onset diabetes which comprised of 28 (26.42%) cases and Type-II non-insulin dependent diabetes or maturity onset diabetes which comprised of 78 (73.58%) cases. The prevalence of Type-I diabetes in Scandinavia was 20% and in Southern Europe 13%, 8% in the USA according to reports of John (1994).

Type-II diabetes (NIDDM) comprises large group as reported 75-80% of North Americans and Europeans.

Regarding the age incidence, the age group of the patients varied from 7 years to 72 years, maximum no. of cases belonged to 4th decade to 6th decade. Sosby (1966) also noted maximum number of cases which belonged to 4th to 6th decade.
Out of total 106 cases in our study, ocular involvement were noted in 95 (89.62%) cases incidence of ocular involvement studied by Kisby (1967) came out to be 64% of all diabetics, who had lenticular changes of same kind or other, ocular symptoms occur in between 20% to 40% of diabetics at the clinical onset of the disease Lister (1935), refractive changes upto 47% Granstrom (1933).

In the present study it was seen ocular involvement was more common in older age groups, in table no. IX, 52 cases out of 56 having ocular involvement in one way or other in age group 41-60 years, and 21 cases out of 22 in age group above 61 years.

Ocular involvement was more in patients having longer duration of diabetes. With duration of diabetes less than 5 years had 20% involvement, and those with 6-10 years 65.22% and 11-15 years 75% and 16-20 years 90% above 21 years had nearly 100% involvement in one way or other.

Involvement of ocular adnexia was in 26 cases. The following lesions were noted facial muscle weakness, no cases were seen.

Trichiasis was observed in 4 (3.78%) cases which comprised of females only. Blepharitis was observed in
8 (7.54%) cases, Recurrent Sty was observed in 11 (10.37%) cases. A. Dolensk and A. Takac (1967) started the involvement of lids in these conditions but about the incidence no data is available.

Acute dacryocystitis was seen in one (0.94%) case and chronic dacryocystitis in 1 case.

Ptosis was observed in one case. There was no case of ophthalmoplegia, although oculomotor nerve palsies have been reported by Brude et al 1985, Rucker 1958, Goldstein 1960, Jaffe 1967. Some of workers have reported that ophthalmoplegia is not common. Waite & Beetham 1935 found a frequency of only 0.4% in 2000 cases of diabetes.

There was no case who had orbital cellulitis, which was noted by Burde (1985), Rootman and Lippincett (1988). The main reason may be the number of cases seen in this study is very less than the study carried by them.

Involvement of conjunctiva was seen in 6 (5.64%). In 3 cases conjunctivitis was seen and 2 cases of Xerosis and 1 case of pterygium, pingicula, scleritis and episcleritis was not seen in any cases.

Corneal lesion in diabetic patients were found in 30 (28.23%) cases. Decreased corneal sensitivity was found markedly impaired in 15 (14.15%) cases. These
findings as compared with Prakash and Kannan (1993) reported 42% of cases of diabetes having decreased corneal sensitivity.

Superficial punctate keratitis was seen in 5 (4.71%) cases and corneal opacity was seen in 5 (4.71%) cases, corneal straiate was seen in 4 (3.77%) cases. One case had corneal ulcer (0.94%). Exposure keratitis and anterior staphyloma was not seen in any case.

Involvement of iris was observed in 9 (8.49%). Acute iridocyclitis was seen in 4 (3.77%) cases. Studies conducted by Marchal (1863) have reported involvement of iris as iritis or iridocyclitis in 0.8 to 8% of cases.

Waite and Beetham (1935) reported about 1.3% of iritis.

Pigmentary changes was seen in 3 (2.83%) cases in our study. Becker (1883), Armaly and Baloglon (1967), Waite & Beetham (1935) in their study found out pigment deposits in various sites in the anterior chamber in almost a third of diabetics, on anterior surface of iris and posterior surface of cornea in 10% of cases and no lens in 3% of cases.

Iris atrophy was observed in 2 (1.86%) cases, these were above 70 years age group patients.
Rubeosis iridis was observed in only one (0.94%) case in our study. A figure of less than 1% in much more reasonable Janert et al (1957) but according to Alagna & Scullica (1956). Chrt (1958) the frequency of rubeosis iridis was about 5%.

Fixed pupillary reflex was observed in 9 (8.4%) cases. Involvement of pupil in diabetic patients studied by another study was around 10% in patients, Rucker (1958), Goldstein and Cogan (1960).

Lenticular changes were observed in 74 (34.9%) cases, our result is nearly same as reported earlier by Janert (1960), who found lenticular changes in 40% of cases and 5% of cases belonged to age group upto 16 years.

Cataract was common in all age group in our study. Flanagan D.W. (1960) also noted that cataract was common in all age groups. Maximum number of cases were of 41-60 years age group. The age at which cataract surgery was performed in diabetic patients was significantly earlier.

Lenticular opacities were more common in female diabetics than the male diabetics. There were 23 females and 14 males. This result is comparable to the report of Heinsius and Arndt 1950, Janert et al 1956.
Blindness due to cataract in diabetic patients was in 10 (4.77%) eyes. This result when compared to another study in West of Scotland (1910) suggested about 25.33% blindness due to cataract among diabetics is higher than our study.

Visual acuity of 6/18 or better was noted in 116 eyes and among these 10 eyes had lenticular changes.

Visual acuity of 6/24 to 3/60 was noted in 82 cases and among these 54 eyes had lenticular changes.

Visual acuity of less than 3/60 was noted in 14 eyes and among these 10 cases had lenticular changes.

**INTRAOCULAR TENSION**

Intraocular tension was recorded in selective patients in which fundus was visible to assess the changes related to retinopathy. There were 26 cases (172 eyes) in which fundus was visible and intraocular pressure was recorded. The range of intraocular pressure varied in all the three grades of retinopathy as well as in patients having fundus findings within normal limits.

Range of intraocular tension varied in various grade of retinopathy, it was towards lower side in Grade III 12.4 to 14.6 mmHg.
Higher side in Grade I and Grade II, ranging from 16.9 to 24.3 mmHg.

Patients having no retinopathy had intraocular tension within normal range of 16.9 to 20.6 mmHg.

It is evident from table no. 14, that total of 40 (23.25%) eyes, of diabetics had no retinopathic changes in fundus and mean intraocular pressure in them is 17.93 ± 1.0 which is within normal range of 16.9 to 20.6 mmHg.

Another important interesting observation of our study was that, as the grade of retinopathy increased, the mean intraocular pressure also showed an increasing tendency until at the final stage grade III retinopathy it declined steeply.

In grade I retinopathy, out of 58 (33.72%) eyes mean average intraocular pressure is found to be 19.12 ± 1.82 with range of 16.9 to 24.3 mmHg, we find a definite increase in the mean intraocular pressure as when compared to patients having no retinopathic changes in fundus.

Grade II retinopathy, out of 49 (27.90%) eyes, similarly, following the tradition showed an increase in mean average intraocular pressure i.e. 19.95 ± 1.91 and ultimately in grade III retinopathy out of 26 eyes which
formed a total of 15.11%, showed 15.43 ± 1.50 of mean intraocular pressure which when compared to those having no retinopathy in fundus 17.93 ± 1.0 shows quite good amount of difference.

On comparison of mean intraocular pressure observed by us in different grade of retinopathies to that of other workers, we find a similar correlation as found by Arora and Prasad (1983). They found mean intraocular pressure in diabetics without retinopathy to be 18.17 mmHg while in eyes with retinopathy, it was 19.99 mmHg (In our study the intraocular pressure in diabetics with retinopathy is 18.95 ± 2.38 and in diabetics without retinopathy 17.93 ± 1.0). Arora and Prasad found significant differences in mean intraocular pressure in proliferative retinopathy when compared with those having no retinopathy. In grade I retinopathy the mean intraocular pressure was 20.98 mmHg. In grade II 21.99 mmHg and proliferative retinopathy group had 15.22 mmHg.

In contrast to other findings, Christiansons (1960) who studied total of 172 diabetic patients, he found a decreasing schiots tension as the grade of retinopathy increased vis 16 mmHg in grade I retinopathy in grade II, the tension decreased to 12.3 mmHg and grade III 9.3 mmHg.
RETINAL STATUS OF EYES:

Table no. 15 shows the retinal status of case material, cases with retinopathy which forms total of 66 i.e. 62.26% of the total case material is nearly 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%, Komuruf (1957) found 601 cases of diabetic retinopathy out of 1285 unselected diabetics 47%, and Dollfus (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. XV, the majority of cases 36 (54.54%) were males and 30 (45.45%) were females.

Retinopathy changes observed among the males 69.23% and among females, it was higher than males being 75%. Duke Elder describes that female - male ratio is 3 : 2 and also that women are more liable to develop retinopathy. In other studies there is much greater incidence among females. Hanum (1938) for eg. in 183 cases of diabetic retinopathy found 72% females and 28% males. The larger statistics of
Portsmann and Wiese (1954), Keiding et al (1952), Jaisert et al (1956) and Babel and Rilliet (1958), however, did not show a difference between the sexes. We also observed that retinopathy is more common in patients of age group above 40 years or advance age and rare in below 40 years. These findings are very much in correlation with studies by Forsyth and Paynt 1956, Imorlund (1959), Girner 1960, Guest Lamplke Kessler and Skillman 1965.

As has been broadly classified earlier table no. XV amongst the different grades of retinopathy, there were 16 males and 10 females (28.26%), in grade 0 retinopathy.

In grade I retinopathy - there were 13 males and 16 females (31.53%).

In grade II retinopathy - there were 14 males and 10 females (26.08%).

In grade III retinopathy - there were 9 males and 3 females (13.04%).

In various grade of retinopathy - study according to Christiansons (1960) found maximum number of cases in grade 0 viz. 33 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 decreasing order.
In our study we observed that the diabetic retinopathy develops in diabetic patients in duration of 16 to 20 years to have all grades of retinopathy while Christianssons (1961) reported retinopathy to develop on an average 16.7 years of duration. In our study we found duration of diabetics more than 5 years is required to develop any retinopathy a figure which is close relation with the studies of Kornurup (1955) upteen workers in the past had reported that a minimum of 3 years period is required to develop any retinopathy (Waite and Beethaman 1935, Wagener 1945, Friendenwald 1950, Lawrance et al 1951, Gardes 1953, Scott (1953).

To develop proliferative retinopathy, our study showed an average duration of 16.5 years on the other hand, patients with proliferative retinopathy constitute 17.5% of total case material with average duration of diabetes of 16 years. According to study by Christianssons (1960) and Kornurup (1958) also had same figures of 16.1 year and diabetic duration to develop proliferative retinopathy.

In our study with relation to duration of diabetes, table no. XVII, it was observed that with duration of diabetes upto 5 years had no retinopathy.

With duration of diabetes upto 10 years 16.66% had no retinopathy. 75% had grade I retinopathy and 8.33% had grade II retinopathy.
With duration of diabetes up to 15 years had 16.60% cases with grade I retinopathy and 83.83% had grade II retinopathy.

With duration of diabetes up to 20 years 70% had grade II retinopathy and 30% had grade III retinopathy.

With duration of diabetes up to 25 years 40% had grade II retinopathy and 50% had grade III retinopathy.

With duration of diabetes more than 25 years had only grade III retinopathy.

These findings clearly suggests that with duration of diabetes, the severity of diabetic retinopathy also increases. In another study by Khan HA and Broadly RE (1975), the prevalence of diabetic retinopathy among patients at Joslin Clinic was 25% in total diabetic population, 7% with less than 10 years duration, 26% with 10 to 14 years duration, 63% in patients with 15 years or more duration of diabetics. Dollfun and Haige (1953) 90% in patients of over 18 years duration of diabetics. Same findings were observed by Khosla et al (1984).

In Nutshell, our study amply demonstrates and collaborates the earlier findings, that diabetes affects all the structures of eye in one way or other, including
lenticular changes, mean intraocular pressure increases as the grade of retinopathy increases ultimately showing a downfall at proliferative retinopathy stage.

The study has also indicated that as the duration of diabetes is increased, it is directly related to the retinopathic grade.