Original Article

Hypertension as Risk Factor in Diabetic Retinopathy in type-2 Diabetes

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Purpose: To evaluate hypertension as a risk factor for diabetic retinopathy in type 2 diabetic patients.

Material and Methods: This case control study of 100 patients, using non-probability purposive sampling, between 40-70 years of ages with equal sex distribution was conducted in the medical department of Sir Syed hospital, Karachi, from August 2007 to October 2007. .

All patients were screened for diabetic retinopathy. The patients with diabetic retinopathy were placed in group DR (diabetic retinopathy) and patients without retinopathy were placed in group NDR (non-diabetic Retinopathy).

Blood pressure measurements were done in all these patients along with fasting blood sugar, random blood sugar and Hb1c. The data was analyzed on SPSS for windows. The comparison of two groups i.e., case control was done by student t-test. Correlation of hypertension to proliferative retinopathy was evaluated by odd ratio.

Results: The correlation between diabetic retinopathy was analyzed in 100 patients. Systolic and diastolic blood pressures were significantly higher in patients with retinopathy (Mean systolic 136 ± 16 mmHg and mean diastolic 84 ± 10 mmHg) than those without retinopathy (Mean systolic 129 ± 17 mmHg and mean diastolic 78 ± 12 mmHg). There was significant correlation of diabetes retinopathy with systolic hypertension ($P < 0.02$) and diastolic hypertension ($P < 0.007$)

Conclusion. The study results suggest that there is strong association between

Diabetes mellitus is a major health problem in Western countries as well as in Pakistan. Pakistan, with its population of 140 million, is estimated to have about 7 million people with diabetes mellitus. Currently it is 8th in the world according to WHO estimation for prevalence of diabetes mellitus and by the year 2025 is expected to rise to the 4th position[1].

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes mellitus is associated with long term damage, dysfunction and failure of various organs, especially the eyes, kidneys, nerves, heart and blood vessels[2].

Blindness is one of the most feared complication of diabetes mellitus but also one of the most preventable. Diabetes mellitus is the commonest cause of blindness in people aged 30-69 years. Twenty years after the onset of diabetes mellitus, almost all patients with type 1 diabetes mellitus and over 60% of patients with type 2 diabetes mellitus will have some degree of retinopathy[3,4]. Vision threatening retinopathy is rare in type 1 diabetes mellitus in the first 3-5 years of diabetes mellitus or before puberty[4]. Even at the time of diagnosis of type 2 diabetes mellitus, about a quarter of patients have established background retinopathy[3].

The risk factors for the development of diabetic retinopathy are duration of diabetes mellitus, hyperglycemia, hypertension, pregnancy, and serum triglyceride level[4].

Retinal hyperperfusion is a key source of injury in diabetic retinopathy associated with shearing damage to capillaries[5]. Increased retinal blood flow is found with conditions that worsen diabetic retinopathy these include hypertension[6], hyperglycemia, pregnancy and autonomic neuropathy.

Improved understanding of the role of hypertension in the pathogenesis of diabetic retinopathy presents both a challenge and an opportunity for ophthalmologists and other diabetic healthcare professionals to improve patient care. Around 40% of patients with type 2 diabetes mellitus are hypertensive, the proportion increasing to 60% by the age 75. Recent reports from the United Kingdom Prospective Diabetes Study (UKPDS) have focused attention on the links between hypertension and sight loss in diabetes mellitus. These reports in type 2 diabetes mellitus accord with previous observational studies in type 1 diabetes mellitus and demonstrate both hypertension as a risk factor for diabetic retinopathy and the beneficial effects of tight blood pressure control[5].

The purpose of this study is to evaluate hypertension as a risk factor for diabetic retinopathy in type 2 diabetic patients.

MATERIAL AND METHODS

This case control study was done in diabetic clinic attached to medical Department, Sir Syed hospital, Karachi, from August 2007 to October 2007. The study was conducted on 100 patients, using non-probability purposive sampling, between 40-70 years of ages with equal sex distribution.

All patients were screened for diabetic retinopathy using a WelchAllyn Fundoscope. The same fundoscope was used for all further fundus examinations. The patients were examined with fully dilated pupils. The fundoscopic finding was verified with slit-lamp biomicroscopy with 90D lens. The patients with diabetic retinopathy were placed in group DR (diabetic retinopathy) and patients without retinopathy were placed in group NDR (non-diabetic Retinopathy).

After resting the patient in supine position for 5 minutes blood pressure measurements were also taken in all these patients using mercury sphygmomanometer.

All patients were advised fasting blood sugar, random blood sugar and HbA_{1C}.

The data was analysed on SPSS for windows. The comparison of two groups i.e., case control was done by student t-test. Correlation of hypertension to proliferative retinopathy was evaluated by odd ratio.

RESULTS

Of the 100 patient in the sample, the mean age of patient with diabetic retinopathy group was 52.5 ± 7 years while it was 52 ± 8 years for nondiabetic retinopathy group. Duration of diabetes was it is 9 ± 5 years in diabetic retinopathy group and 8 ± 5 years in

nondiabetic retinopathy group. Regarding mean age and duration of diabetes mellitus there is not much difference between the two groups

Mean systolic blood pressure in diabetic retinopathy group (Fig. 1) was 136 ± 16 mmHg while it was 129 ± 17 mmHg in nondiabetic retinopathy group (Fig. 2) so it was quite obvious that patients in diabetic retinopathy group with retinopathy have higher mean systolic blood pressure than nondiabetic retinopathy group patients (P< 0.02).

The mean diastolic blood pressure in patients in diabetic retinopathy group (Fig. 3) was 84 ± 10 mmHg and it was 78 ± 12 mmHg in nondiabetic retinopathy group (Fig. 4), (P<0.007, CL 1.74 - 10.46). The mean of fasting blood sugar in diabetic retinopathy group (Fig. 5) was 172 ± 64 gm/dL while it was 173 ± 61 gm/dL in nondiabetic retinopathy group (Fig. 6). The mean HbA_{1C} in subjects with diabetic retinopathy group was 7.08 ± 0.3 while it was 7.004 ± 0.59 in nondiabetic retinopathy group. There was significant difference between the two groups in fasting blood glucose level and HbA1c

DISCUSSION

We analyzed the association between diabetic retinopathy and blood pressure and found that patients with retinopathy had significantly higher systolic and diastolic hypertension than those without retinopathy.

Ishihara[7] et al who had studied on 742 type 2 diabetic patients in which he correlated various variables with diabetic retinopathy. The correlation of diabetic retinopathy with systolic hypertension was significant (P<0.01) but when correlated with diastolic hypertension it was not significant. When diabetic retinopathy was correlated with age of the patient (P<0.05) and duration of diabetes mellitus (P<0.001) it was significant. The correlation of diabetes retinopathy with HbA_{1C} was also highly significant (P<0.001).

Similarly Van Leiden et al[8] studied relationship of diabetic retinopathy with various risk factors in 233 individuals. His study gives P-value of <0.03 when diabetic retinopathy was correlated with age of patient but P-value was also <0.03 when diabetic retinopathy was correlated with HbA_{1C}, in both situations it was significant.

In his study correlation of diabetic retinopathy with fasting blood sugar was also significant (P<0.08). His study also had significant correlation of diabetic retinopathy with systolic hypertension (P<0.02) but correlation of diabetic retinopathy with diastolic hypertension was not significant.

In our study correlation was found not to be significant when diabetic retinopathy was correlated with age of the patient, duration of diabetes mellitus, fasting blood sugar and $HbA_{1C.}$ But in our study there is significant correlation when diabetic retinopathy was correlated with systolic hypertension (P<0.02, CL 0.82 - 13.58) and when diabetic retinopathy correlated with diastolic hypertension (P<0.007, CL 1.74 - 10.46).

In our study the two groups are well matched in terms of age, duration of diabetes, fasting blood glucose and HbA_{1C}. Therefore this constituted a good cohort to study the effect of systolic and diastolic hypertension.

One of the limitations of our study is the relatively small number of cases. Therefore only the strongest associations with retinopathy are expected to be detected.

CONCLUSION

The study results suggest that there is strong association between diabetic retinopathy and hypertension.

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REFERENCE

1. **Basit A, Hydrie MZI, Ahmed K, et al.** Prevalence of diabetes, impaired glucose and associated risk factors in a rural area of Baluchistan province according to new ADA criteria, JPMA. 2002; 52; 357-60.
2. The Expert Committee on the diagnosis and Classification of Diabetes Mellitus. Report of the expert committee on the

diagnosis and classification of diabetes mellitus. Diabetes Care 2003; 26; S5-S20.
3. **Watkins PJ.** ABC of diabetes retinopathy. BMJ 2003; 326; 924-6.
4. **Fong DS, Aiello L, Gardner TW, et al.** Diabetic retinopathy. Diabetic Care. 2003; 26: S99-S102.
5. **Gillow JT, Gibson JM, Dodson PM.** Hypertension and diabetic retinopathy-what's the story? Br J Ophthalmol. 1998; 83: 1083-7.
6. **Klein R, Klein BEK.** Blood pressure control and diabetic retinopathy. Br J Ophthalmology. 2002; 86: 365-76.
7. **Ishihara M, Yukimura Y, Aizawa T, et al.** High blood pressure as risk factor in diabetic retinopathy development in NIDDM patients. Diabetic Care. 1987; 10: 20-5.
8. **Van Leiden H, Dekker JM, Moll AC, et al.** Risk factors for incident retinopathy in a diabetic and nondiabetic population: The Hoorn Study. Arch Ophthalmol. 2003; 121: 245-