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Original Research Article

Study of Hypertensive Retinopathy in Type 2 Diabetes Patients.

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Abstract:
Hypertension is a leading cause of morbidity and mortality and is associated with the risk of cardiovascular, cerebrovascular disease, and target organ damage. The risk increases exponentially in individuals with diabetes. Hypertensive retinopathy is a marker for target organ damage, so screening for hypertensive retinopathy helps in cardiovascular risk stratification. This study was conducted with an objective to screen for hypertensive retinopathy among known diabetics. 102 known Type 2 diabetic subjects, both males and females were included in study. Blood pressure was recorded in all subjects. Hypertensive subjects retinal examination was done. A comprehensive ophthalmic assessment including a fundus examination was performed. Our study shows out of 102 diabetic subjects 61(59.8%) were hypertensive and 41 were normotensive (40.19%). Out of 61 hypertensive patients 21 were males and 40 were females. Severity of Hypertensive Retinopathy shows 53(86.88%) subjects had Grade I, 6(9.83%) subjects had Grade II and 2(3.27%) subjects had Grade III Hypertensive Retinopathy. Early detection of hypertensive retinopathy with cardiovascular risk stratification and initiation of prompt treatment among the high risk individuals will help reduce the morbidity caused due to end-organ damage and premature mortality to a greater extent and will pave the way forward to achieving sustainable developmental goals.

Keywords: Hypertension, Type 2 Diabetes, Retinopathy.

Introduction

Systemic arterial hypertension is a major public health problem and a treatable risk factor for different systemic conditions responsible for serious morbidity and mortality. World Health Organization (WHO), in the adult population, defines hypertension as a systolic pressure greater than 140 mmHg and/or a diastolic pressure greater than 90 mmHg (both measured on two different days). The WHO estimates that 1.13 billion people worldwide have hypertension and fewer than 1 in 5 people with hypertension have it under control. With advances in medical technology, the life expectancy continues to extend, and the number of patients with high blood pressure has increased. Hypertension is a well-known risk factor for other diseases, called hypertension-mediated organ damage (HMOD), such as stroke, disability, myocardial infarction, heart failure, kidney failure and early death[1]. Hypertension affects the eyes through a series of pathophysiological modifications that can damage the retinal, choroidal, and optic nerve circulations causing respectively retinopathy, choroidopathy, and optic neuropathy. The most common ocular manifestation of high blood pressure is hypertensive retinopathy (HR). In 1898 Marcus Gunn first documented the retinal vascular abnormalities associated with hypertension[2], Wong and Mitchell[3] defined HR as “retinal microvascular signs that develop in response to raised blood pressure”. The eye is the only organ in the human body where it’s possible to detect vascular changes due to high blood pressure in vivo. Diabetic patients are 29 times more likely to become blind than non-diabetic patients. Diabetic retinopathy (DR) is one of the most frequent diabetes adversities; it is associated with long DM duration and with inadequate glycemic control. [4]According to estimates, 99% of patients with type 1 DM, and 60% of patients with type 2 DM, develop some form of DR after 20 years - DR is the most prevalent cause of acquired blindness among adult individuals.[5] Systemic Arterial Hypertension (SAH) is a highly prevalent disease that affects approximately 50-70% of the elderly population.[7] It can be defined as increased blood

pressure of multifactorial etiology, which has multisystemic repercussions that first affect the microvasculature of target organs such as the eyes; with emphasis to hypertensive retinopathy (HR).[6] HR is described as a set of retinal changes in individuals with increased systemic blood pressure. It is essential investigating HR incidence in SAH patients to enable implementing drug therapy, even in patients classified as stage 1 SAH, due to great SAH-correlated cardiovascular risks. Diabetes and hypertension are a dual burden to the healthcare system as theyoften exist together.[8] Hypertension affects approximately 70% of diabetic patients.8 Both diabetes and hypertension are vascular risk factors and significantly increase the risk of ischemic cerebrovascular disease and retinopathy. [9] When diabetes and hypertension coexist, the risk of cardiovascular diseases increases exponentially. Similarly, retinopathy becomes rapidly progressive due to endothelial dysfunction and results in accelerated diabetic retinopathy, causing subsequent damage to the eyes and visual impairment.[10] Diabetic retinopathy is a potentially blinding condition, while hypertensive retinopathy is not as devastating for vision as diabetic retinopathy but serves as a marker for end-organ damage. Place alongside this fact that systemic hypertension is also a risk factor for several potentially blinding conditions like(i)central retinal artery occlusion,(ii)branch retinal artery occlusion, (iii) central retinal vein occlusion, (iv) branch retinal vein occlusion, (v) glaucoma, (vi) age-related macular degeneration, and (vii) suprachoroidal hemorrhage during ophthalmic surgeries. Hypertension acts as a silent killer for many years before the systemic target organ damage is clinically apparent. Hypertensive retinopathy serves as a marker for overt target organ damage. Hence, the diagnosis of hypertensive retinopathy helps in cardiovascular risk stratification. Early detection of hypertensive retinopathy and end-organ damage coupled with prompt management determines the cardiovascular prognosis to a greater extent. Hence, this study was designed with an objective to screen for hypertensive retinopathy among the known diabetic patients

Material and Methods

102 known Type 2 diabetic subjects, both males and females were included in study. Blood pressure was recorded in all subjects. Hypertensive subjects retinal examination was done. A comprehensive ophthalmic assessment including a fundus examination was performed by qualified ophthalmic specialists using slit-lamp biomicroscopy and opthalmoscope with dilated pupils and fundus photography adhering to clinical quality assurance standards. The presence of microvascular abnormalities including microaneurysms, retinal haemorrhages, hard exudates, cotton wool spots, venous dilation and beading, intraretinal microvascular abnormalities, and abnormal growth of new blood vessels were assessed. Hypertensive retinopathy was graded based on Keith, Wagener, and Barker hypertensive retinopathy classification.[10] Grading of hypertensive retinopathy using Keith, Wagener, and Barker classification based on Symptoms.

Grade I: Mild generalised retinal arteriolar narrowing and sclerosis No symptoms.

Grade II: Definite focal narrowing and arteriovenous crossing. Moderate to marked sclerosis of the retinal arterioles. Exaggerated arterial light reflex Asymptomatic.

Grade III : Retinal haemorrhages, exudates and cotton wool spots. Sclerosis and spastic lesion of retinal arterioles. Symptomatic.

Grade IV: Severe grade III and papilledema Reduced survival.

Results

Table 1: Hypertension in Diabetic subjects

Diabetic subjects	Diabetic subjects n =102	Percentage
DM with Hypertension	61	59.8%
DM without Hypertension	41	40.19%

Table 2: Gender wise diabetic subjects with Hypertensive Retinopathy

Gender	DM with Hypertension n=61	Percentage
Males	21	34.42 %
Females	40	65.57 %

Table 3: Severity of Hypertensive Retinopathy

Hypertensive Retinopathy severity	n=61	Percentage
Grade I	53	86.88 %
Grade II	06	9.83 %
Grade III	02	3.27 %

Table 1 shows out of 102 diabetic subjects 61(59.8%) were hypertensive and 41 were normotensive(40.19%)Table 2 shows out of 61 hypertensive patients 21 were males and 40 were

females. Table 3 shows severity of Hypertensive Retinopathy . 53(86.88 %)subjects had Grade I , 6(9.83 %)subjects had Grade II and 2(3.27 %) subjects had Grade III Hypertensive Retinopathy .

Discussion

Non-communicable diseases have emerged as a global public health crisis and a leading cause of premature mortality. Hypertension and diabetes mellitus being vascular risk factors increase the risk of both cardiovascular and cerebrovascular events. Uncontrolled hypertension damages the retinal vasculature resulting in hypertensive retinopathy. Hence active screening of hypertensive retinopathy helps in early detection and cardiovascular risk stratification. The diagnosis of hypertensive retinopathy is based on findings seen on fundoscopicexamination,usually under adequate mydriasis in an outpatient department which is time-consuming and hence frustrates large-scale screening. From a multimorbidity perspective, hypertension is approximately twice as common in patients with diabetes compared to those without it [11]. The association between elevated BP levels and poor microvascular outcomes such as DR is considered unequivocal and independent of other confounding risk factors in diabetic patients, as the evidence indicated an involvement of chronic inflammation and oxidative stress caused by hypertension [12]. However, suboptimal control of BP has been commonly seen in patients with diabetes partly as a result of 'clinical inertia' in routine practice [13,14]. The inertia in BP control may also play a role in the onset and progression of DR. A recent observational cohort study conducted among T2DM patients in southeast Asia reported an association between 'clinical inertia' and development of DR . Overall, it was possible noticing that impaired fundus of the eye and low vision were closely correlated to hypertension and DM, to prolonged exposure to these diseases and to old age. It was also noticed that the presence of most specific changes was more often observed in the group diagnosed with DM and SAH (45.5%), a fact that denoted the synergistic action of these pathologies in retinal damage. There is no consensus in the literature about the most affected sex. [15-22]

Our study shows out of 102 diabetic subjects 61(59.8%) were hypertensive and 41 were normotensive(40.19%). Out of 61 hypertensive patients 21 were males and 40 were females. Severity of Hypertensive Retinopathy shows 53(86.88 %)subjects had Grade I , 6(9.83 %)subjects had Grade II and 2(3.27 %) subjects had Grade III Hypertensive Retinopathy .

It is clear that SAH and DM have significantly negative impact on the vitality of the ocular system. Patients should be followed-up by general physicians, who should perform annual eye examinations to help reducing harmful effects deriving from these diseases. This practice enables such professionals to better control the clinical evolution of these patients, a fact that, above all, enables having greater accuracy at the time to indicate ophthalmic evaluations. Such measures aim at early diagnosing certain pathologies and at avoiding future complications; consequently, they help reducing health system costs and improving patients' quality of life.

Conclusion

The coexistence of systemic hypertension not only exacerbates diabetic retinopathy, which is potentially a blinding condition, but also is an independent risk factor for coronary artery disease, cerebrovascular disease, renal dysfunction and other potentially blinding conditions like central retinal and vein occlusions, branch retinal vein occlusion, non-arteritic ischemic optic neuropathy, glaucoma, age-related macular degeneration and suprachoroidal haemorrhage during ophthalmic surgeries.This fact highlights the need for better screening measures which will pick out those who are at risk without an elaborate health check-up which can defeat screening efforts.

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