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Original Research Article

Prevalence of Retinal Vein Occlusion in Diabetic Patients and its Association with Systemic Illness in a Tertiary Care Teaching Hospital

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Abstract

Background and Aim: The likelihood of endothelial damage or irregular blood flow is increased by systemic conditions such hypertension (HTN), dyslipidemia, diabetes mellitus (DM), and cardiac disorders; as a result, they are linked to retinal vein occlusion. The purpose of the current study was to determine the prevalence of retinal vein blockage in diabetic patients and its relationship to systemic illness at a teaching hospital that provides tertiary care.

Material and Methods: The current cross-sectional study was carried out over the course of a year at the Tertiary Care Teaching Institute of India. The patient received fundus fluorescein angiography, optical coherence tomography, and direct and indirect ophthalmoscopy. We acquired medical histories that included information on the duration of diabetes, hypertension, hyperlipidemia, and cerebro-vascular accidents.

Results: In this investigation, RVO was found in 7% of the patients (n=70), 40 of whom were men (57.7%) and 30 of whom were women (52.85%). Eighty percent (n=56) of the patients had BRVO, with 12 (75%) having bilateral involvement and 44 (81.48%) having unilateral BRVO. 20% (n=14) of the patients had CRVO, of which 10% (or 18.5%) had unilateral involvement and 4% (or 25%) had bilateral CRVO. RVO was substantially related with diabetic patients who had a history of hypertension, hyperlipidemia, and CVA. ($p< 0.0001$).

Conclusion: The multifactorial condition known as retinal vein occlusion. Ageing, hypertension, hyperlipidemia, and CVA are some of the risk factors for RVO in diabetics with poorly regulated blood sugar levels.

Keywords: Diabetes Mellitus, Diabetic Retinopathy, Ophthalmoscopy, Retinal Vein Occlusion.

Introduction

One of the main causes of blindness in working-age adults and the elderly globally is diabetic retinopathy.[1,2] After diabetic retinopathy, retinal vein occlusion (RVO) is the second most frequent cause of retinal vascular disease and a crucial factor in the

development of painless vision loss. [3–5] There are 16.4 million adult cases of retinal vein occlusion worldwide, of which 13.9 million have BRVO and 2.5 million have CRVO.[6] Currently, sedentary lifestyle modifications may increase systemic disorders such diabetes mellitus, hypertension, hyperlipidemia, and cardiovascular conditions that contribute to retinal issues.[7] Vision-threatening conditions may cause irreversible visual damage and blindness as a result of late discovery and delayed treatment.[8]

The main cause of BRVO is arterial stiffness, which may result in venous compression at the point where the arteries and veins join and share an adventitial sheath. When a vein is compressed, the blood flow becomes turbulent, which causes thrombus to form in the vein lumen. [9] In 63% to 66% of eyes with BRVO, the superotemporal quadrant is the most frequently afflicted. Involvement of the inferotemporal retina in 22% to 43% of BRVO-affected eyes. Similar to how the central retinal vein and artery share a sheath at their places of intersection posterior to the lamina cribrosa, CRVO may result from atherosclerotic alterations in the artery.[10,11]

The risk for endothelial damage or abnormal blood flow is increased by systemic conditions like hypertension (HTN), dyslipidemia, diabetes mellitus (DM), and heart diseases; as a result, they are linked to RVO. Diabetes mellitus (DM), with a prevalence of 2.8% in 2000 and an estimated prevalence rate of 4.4% in 2030, is an increasingly severe epidemic health problem globally linked with serious acute and chronic complications, as a result of changing lifestyles and an ageing population.[12-20] Because of this, this meta-analysis was able to identify DM as a potential risk factor. The purpose of the current study was to determine the prevalence of retinal vein blockage in diabetic patients and its relationship to systemic illness at a teaching hospital that provides tertiary care.

Material and Methods

The current cross-sectional study was carried out over the course of a year at the Tertiary Care Teaching Institute of India. The study included all type II diabetes patients who visited the outpatient department at the Tertiary Care Teaching Institute of Ophthalmology in India. Following inclusion criteria, a total of 1000 participants were enrolled in the study.

Patients with type II diabetes who did not have RVO confirmed by ocular examination and expert opinions, patients younger than 45 years old, patients with associated ocular diseases causing visual impairment, patients who were immunocompromised or taking immunosuppressive medications, pregnant women, and patients who refused to participate in long-term follow-up were excluded from the study.

Written agreement was obtained before the patient received a visual acuity test using a Snellen chart, an IOP measurement, a slit lamp examination, direct and indirect ophthalmoscopy, an OCT, and, if necessary, FFA. A standard questionnaire was used to get a thorough history. Blood samples from each individual were tested for fasting blood sugar levels, blood sugar levels two hours after a meal, blood sugar levels at random, and the percentage of HbA1c. A blood test for the serum lipid profile was also performed. Blood pressure was measured using a conventional procedure.

To document the status of diabetes, ICMR (Indian Council of Medical Research) criteria were followed. 17 When fasting plasma glucose was less than 110 mg/dl, two hours after a meal, it was 140 mg/dl, and the HbA1c was less than 5.7%, we considered diabetes to be under satisfactory control. A person was considered diabetic if their fasting plasma

glucose level was >126 mg/dl, 2 hour postprandial glucose level was >200 mg/dl, random blood glucose level was >200 mg/dl, and their HbA1c level was >6.5%. When the blood pressure was 140/90 mmHg, hypertension was regarded as normal by Indian norms.[21]

Triglyceride levels were seen as normal when under 150 mg/dl and abnormal when over 150 mg/dl, and total cholesterol levels were regarded as normal when under 200 mg/dl and abnormal when over 200 mg/dl. HDL was regarded as normal when it was greater than 40 mg/dl, abnormal when it was less than 130 mg/dl, and abnormal when it was greater than 130 mg/dl.

The World Health Organisation (WHO) criteria for the definition of stroke were taken into consideration:[22] (1) in which an area of brain is transiently or permanently affected by ischemia or bleeding or (2) in which one or more brain blood vessels are primarily involved in a pathological process, or (3) a combination of these conditions. Based on the 10th version of the International Classification of Disease[23], visual impairment was identified. Low vision was described as having a best corrected visual acuity (BCVA) of less than 3/60 but greater than or equal to 6/18, which was the threshold for visual impairment. When BCVA was 3/60, blindness was taken into account.

Statistical Analysis

The collected data was organised, inputted, and exported to the data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA) after being combined and entered into a spreadsheet programme (Microsoft Excel 2007). The level of significance and confidence level for each test were set at 5% and 95%, respectively.

Results

All type II diabetes patients who visited the Tertiary Care Teaching Institute of India's OPD were included in the study. There were 1000 diabetes participants in the trial. The average age was 58. In this investigation, RVO was found in 7% of the patients (n=70), 40 of whom were men (57.7%) and 30 of whom were women (52.85%). (Table 1)

Eighty percent (n=56) of the patients had BRVO, with 12 (75%) having bilateral involvement and 44 (81.48%) having unilateral BRVO. 20% (n=14) of the patients had CRVO, of which 10% (or 18.5%) had unilateral involvement and 4% (or 25%) had bilateral CRVO. (Table 2)

BRVO occurred more frequently than CRVO. There was a 3.8-times higher prevalence of BRVO than CRVO. Bilateral BRVO occurred less frequently than unilateral BRVO. 60% of patients had macula involving BRVO, indicating that this type of BRVO is more common than non-macula involving BRVO. More non-ischemic CRVOs than ischemic CRVOs were discovered. After best correction, 38% of all RVO individuals had low vision in their better eyes. Low vision was present in 40% and 24% of the patients with BRVO and CRVO, respectively. As BRVO occurs more frequently than CRVO, patients with BRVO were more likely to experience low vision. Diabetes could have been present for up to 16 years.

In this study, RVO most frequently occurred five years after the diagnosis of diabetes mellitus.(Table 3) In this investigation, diabetes patients' histories of hypertension, hyperlipidemia, and CVA were significantly linked with the development of RVO ($p<0.05$).

Table 1: Gender wise Distribution of study Population

Gender	Number	Percentage (%)
Male	40	57.7
Female	30	42.85
Total	70	100

Table 2: Clinical profile of RVO in diabetic patients

Category	No. of subjects (n, %)	No. of eyes	No. of subjects Both eyes involvement (n, %)	No. of subjects One eye involvement (n, %)	Right eye (n, %)	Left eye. (n, %)
BRVO	56 (80)	84	12 (75)	44 (81.48)	32 (82.05)	12 (80)
CRVO	14 (20)	24	4 (25)	10 (18.5)	7 (17.94)	3 (20)
Total	70	108	16	54	39	15

Table 3: Duration of diabetes in people with RVO

Diabetes duration	Right Eye Patients	%	Left Eye Patients	%	Both Eyes Patients	%
≤5 years	10	34.48	8	30.76	5	33.33
6-10 years	7	24.13	8	30.76	2	13.3
11-15 years	6	20.68	5	19.23	4	26.6
>16 years	6	20.68	5	19.23	4	26.6
Total	29	100	26	100	15	100

Discussion

As a result of macular edoema and retinal ischemia, RVO—the second most prevalent retinal vascular disorder—is a reasonably frequent and common cause of vision loss, particularly in elderly people.[24] Although it has been known about for more than a century, the precise pathophysiology is still unknown. Additionally, systemic diseases such HTN, arteriosclerosis, DM, hyperlipidemia (HLD), vascular cerebral stroke, blood hyperviscosity, and thrombophilia are linked to the risk factor for RVO.[25] Early in 2008, O'Mahoney et al[26] concluded that DM is a risk factor for RVO in adults based on the analysis of 2877 RVO cases and 13,225 controls from 20 studies. Since then, other investigations on the connection between RVO and DM have been published, and these studies may dramatically alter their conclusion. New analysis was therefore required. RVO is a frequent finding in persons with type II diabetes mellitus, according to a study by Harsha Bhattacharjee et al.[27] in India. The likelihood of developing RVO is increased by a medical history of hypertension and stroke. Similar findings regarding associations and risk factors for the development of RVO in diabetic patients were also found in our investigation. Diabetes is a significant risk factor for RVO, according to a different study by Yun Wang et al.[28].

According to Hayreh et al.[29], men who are elderly and who have uncontrolled diabetes are at an increased risk of developing RVO. It closely resembles our study, in which 78% of participants had uncontrolled diabetes and went on to develop RVO. RVO is a risk factor for cardio vascular mortality in diabetes patients aged 43 to 69, according to a study

by Cugati et al.[30]. A different study found that those with RVO have a higher risk of cardiovascular disease and a higher prevalence of stroke than people of the same age without the condition.[31] The current study also demonstrates the strong link between RVO and cardio vascular mortality.

RVO was present in 7% of the diabetes mellitus patients in our research. This prevalence is higher than that of RVO, which was present in 1.6%, 0.15%, and 0.8% of the participants in the Blue Mountain Eye Study, the Framingham Eye Study[32], and the Beaver Dam Eye Study[4], respectively. According to a hospital-based study [33] that included 187 RAO patients, CRAO accounted for 57% of all RAO instances, whereas noncentral RAO, such as cilioretinal artery blockage, accounted for 43%. Utilising claims data, few epidemiological reports have examined the prevalence of noncentral RAO.[5] The incidence of CRAO in the same region was 2.7 per 100 000 person-years, whereas a subsequent study in Baden-Wuerttemberg, Germany (n = 4104 201) revealed an incidence of 4.5 per 100 000 person-years, which was higher. A comparable study conducted in India by Harsha Bhattacharjee et al.[27] found that diabetic people had a 3.4% prevalence of RVO, which is once more a lower prevalence than the finding of our investigation. 38 of the 4,711 people in the 30 years and older age group who participated in the Jonas et al. [34] investigation on the prevalence and correlates of retinal vein occlusions in rural central Indian population had the condition. They came to the conclusion that higher age (p=0.007), higher systolic blood pressure, higher urea blood content, and a narrow anterior chamber angle were all linked with the occurrence of RVO.

In the current study, 78.5% of the participants had BRVO while 21% had CRVO, making BRVO almost 3.7 times more prevalent than CRVO. This finding is consistent with a research by S. Rogers et al.[6] that was published by the International Eye Disease Consortium and described the prevalence of RVO in the USA, Australia, Europe, and Asia. The prevalence rate of DM was previously observed to be lower in the BRVO group (12.2%) than in the control group (15%) by Pinna et al [35]. However, according to Demir et al.[36] and Christodoulou et al.[37], DM was more prevalent in the BRVO group (24% and 16.7%, respectively) than in the control group (14% and 2.4%, respectively). An another report by Jonas et al.[38] showed in their study that branch retinal vein occlusions being approximately seven times more common than central retinal vein occlusions.

The primary limitation of the study was that it was an opportunistic hospital-based screening of patients who attended the Ophthalmology OPD in the same tertiary care centre. Another limitation was that we were unable to determine the prevalence and risk factors of RVO in young age diabetic population. Additionally, the sample size is restricted in terms of age because the study only includes type II diabetics.

Conclusion

The multifactorial condition known as retinal vein occlusion. Ageing, hypertension, hyperlipidemia, and CVA are some of the risk factors for RVO in diabetics with poorly regulated blood sugar levels. Therefore, if recurrence and additional visual loss are to be avoided, it is crucial to promptly check high blood pressure, lipid profile abnormalities, and other associated risk factors in diabetic individuals with RVO. Given the aforementioned drawbacks, more thorough research on the connection between RVO and DM should be done in the future.

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