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Fundus Changes in Chronic Kidney Disease Patients on Maintenance Haemodialysis

Authors
Brijesh Singh[1], Vivek Kumar Verma[2*], Gaurav Agrawal[3], V.Vijayavarman[4] Geeta Singh[5]
[1]Assistant Professor, Dept of Ophthalmology, U.P. University of Medical Sciences, Saifai, Etawah, India
[2]Lecturer, Dept of General Medicine, U.P. University of Medical Sciences, Saifai, Etawah, India 206130
[3]Junior Resident, Dept of Ophthalmology, U.P. University of Medical Sciences, Saifai, Etawah, India
[4]Junior Resident, Dept of General Medicine, U.P. University of Medical Sciences, Saifai, Etawah, India
[5]Senior Medical Officer, U.P. University of Medical Sciences, Saifai, Etawah, India 206130
*Corresponding Author
Dr Vivek Kumar Verma
Lecturer, Dept of General Medicine, U.P. University of Medical Sciences, Saifai, Etawah, India 206130
Email: *vk.rims@gmail.com*, Mob. No.: +917248792880

Abstract

Introduction: *The vessel calibres of retinal arterioles decreased progressively with each chronic kidney disease stage of renal failure, suggesting that progression of renal dysfunction might be associated with retinal vessel constriction. Retinal microvascular abnormalities are common in chronic kidney disease because hypertension, renovascular disease, and diabetes account for more than half of all patients with renal failure.*

Material and Methods: *Total 128 patients having end stage chronic kidney disease on maintenance haemodialysis were examined. Patients of chronic kidney disease on maintenance hemodialysis were included and cases of reversible kidney injury were excluded. Direct and Indirect ophthalmoscopy along with history and examination was done.*

Results: *Total 128 patients, 96 (75%) male and 36 (25%) female were included. Male to female ratio was 4:1.Mean age of patients was 34.55±12.98 years with minimum age of 8 years and maximum age of 76 years. Most of the patients belong to age group 31-40 years. Minimum duration from initiation of dialysis therapy was 6 months and maximum duration was 9 years with average duration of 2.61±1.75 years. Most common fundus change was mild retinopathy found in 60 (46.88%) patients followed by moderate retinopathy found in 18 (14.06%) patients followed by severe retinopathy found in 8 (6.25%) patients. However fundus was normal in 42 (32.81%) patients. Most common type of retinopathy was hypertensive retinopathy found in 39 (30.47%) patients followed by mixed type of retinopathy 31 (24.22%) patients, diabetic retinopathy 12 (9.38%) patients, papilloedema found in 3 (2.34%) patients, macular oedema found in 1 (0.78%) patient. However no retinopathy found in 42 (32.81%) patients.*

Conclusion: *Hypertensive retinopathy was the most common type of retinopathy found in haemodialysis patients followed by mixed retinopathy, diabetic retinopathy, papilloedema and macular oedema. However no retinopathy found in about 1/3 of patients. In haemodialysis patients with retinopathy, majority had mild retinopathy.*

Keywords: *Fundus changes, Haemodialysis, Retinopathy, Papilloedema.*

Introduction

Chronic Kidney Disease (CKD) is a general term for heterogeneous disorders affecting kidney structure and function with variable clinical presentation, in part related to cause, severity and the rate of progression. Earlier stages of kidney disease are often asymptomatic, are detected during the evaluation of comorbid conditions, and may be reversible.[1]

CKD is emerging as a major health problem worldwide which is associated with markedly reduced quality of life and excess mortality.[2] Diabetic kidney disease followed by hypertensive nephropathy is the most common causes of chronic kidney disease.[3]

Like face is the index of the mind, the eye can be the index to the disease processes in the kidney. Renal microvascular pathology is thought to play an important role in the development of renal insufficiency. In patients on maintenance hemodialysis there is change in intra ocular pressure during dialysis. Related to change in oncotic and hydrostatic pressures during hemodialysis.[4,5]

The renal vascular pathology requires invasive procedures for assessment. Conversely, retinal vasculature can be observed noninvasively and offers a unique opportunity to explore the association between systemic microvascular disease and renal function. In addition, several studies have shown correlations between retinopathy and nephropathy changes in diabetes.[6,7]

A report from the Atherosclerosis Risk in Communities (ARIC) Study demonstrated a strong association between retinopathy features and renal dysfunction that was independent of age, diabetes, hypertension, and other risk factors.[8]

Thickening of the basement membrane in the retinal and glomerular capillary vessels has been seen in diabetic retinopathy and nephropathy, suggesting that retinopathy and nephropathy share similar microvascular pathological pathways related to abnormal glucose metabolism and other processes, e.g., inflammation and endothelial dysfunction.[9]

Clinical studies have reported that the vessel calibres of retinal arterioles decreased progressively with each CKD stage of renal failure, suggesting that progression of renal dysfunction might be associated with retinal vessel constriction.[10,11]

Retinal microvascular abnormalities are common in chronic kidney disease because hypertension, renovascular disease, and diabetes account for more than half of all patients with renal failure. They represent "traditional" risk factors for macro- and microvascular disease. "Non-traditional" risk factors such as inflammation, calcification, and endothelial dysfunction may contribute to the increased vascular risk, too.[12,13,14]

Few renal diseases have characteristic retinal features due to shared similarities between both structures. This is true because the inner retina and glomerular filtration barrier share developmental pathways and structural features, including ciliated epithelial cells, basement membranes comprising collagen IV, and the extensive capillary beds seen in the choroid capillaries and glomerulus.[15,16,17,18]

The aim of this study was to record the fundus changes in patients with chronic kidney disease and to correlate severity of chronic kidney disease with disability.

Material and Methods

This study was conducted in Dialysis Unit of Uttar Pradesh University of Medical Sciences, Saifai, Etawah from July 2018 to December 2018. This was a cross sectional, non-interventional, hospital based study. Total 128 patients having end stage chronic kidney disease on maintenance haemodialysis were examined.

Inclusion criteria: Patients of chronic kidney disease on maintenance hemodialysis.

Exclusion criteria: (1) Cases of reversible kidney injury. (2) Patients who refused for consent.

Each patient was subjected to Direct and Indirect ophthalmoscopy along with history and examination.

Statistical Analysis

Data entered in Microsoft excel and analysed in SPSS version 25.0.0.0. Mean and percentage were used to interpret results of the study.

Results

All patients included in this study were registered under "Asadhya Rog Scheme" of the government and receiving free of cost dialysis therapy, investigations and drugs from the university hospital. A total of 128 patients were included in the study who satisfied the inclusion and exclusion criteria and willing to participate in the study.

Out of total 128 patients, 96 (75%) patients were male and 36 (25%) patients were female. Male to female ratio was 4:1.

In this study mean age of patients was 34.55±12.98 years with minimum age of 8 years and maximum age of 76 years. Most of the patients belong to age group 31-40 years. (Fig.1)

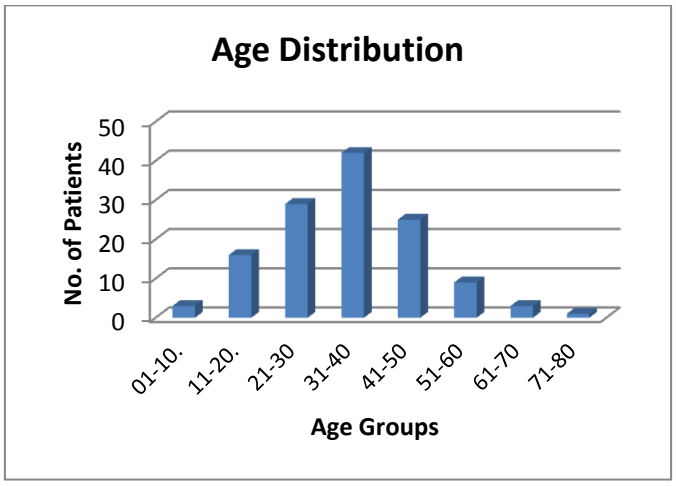

Fig.1 Age Distribution

Minimum duration from initiation of dialysis therapy was 6 months and maximum duration was 9 years with average duration of 2.61±1.75 years. (Fig.2)

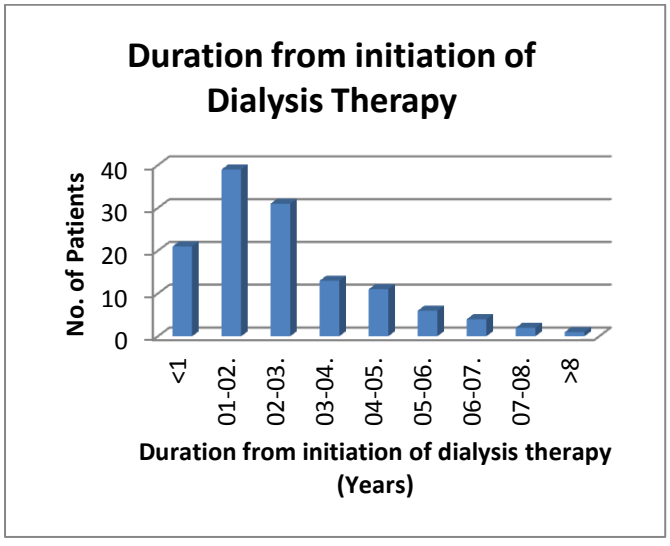

Fig.2 Duration from Initiation of Dialysis Therapy

Most common fundus change was mild retinopathy found in 60 (46.88%) patients followed by moderate retinopathy found in 18 (14.06%) patients followed by severe retinopathy found in 8 (6.25%) patients. However fundus was normal in 42 (32.81%) patients. (Fig.3)

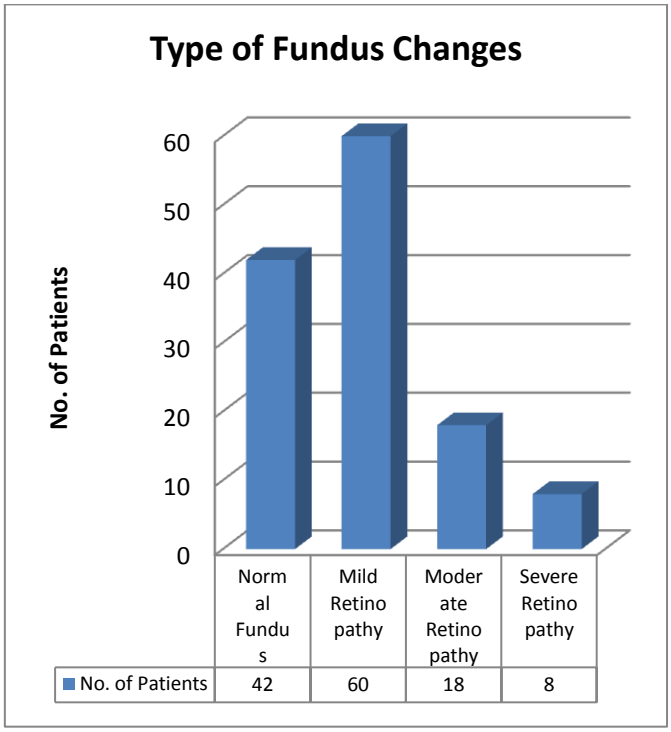

Fig.3 Type of Fundus Changes

Most common type of retinopathy was hypertensive retinopathy found in 39 (30.47%) patients, mixed type of retinopathy was found in 31 (24.22%) patients, diabetic retinopathy was found in 12 (9.38%) patients, papilloedema found in 3 (2.34%) patients, macular oedema found in 1 (0.78%) patient. However no retinopathy found in 42 (32.81%) patients. (Fig.4)

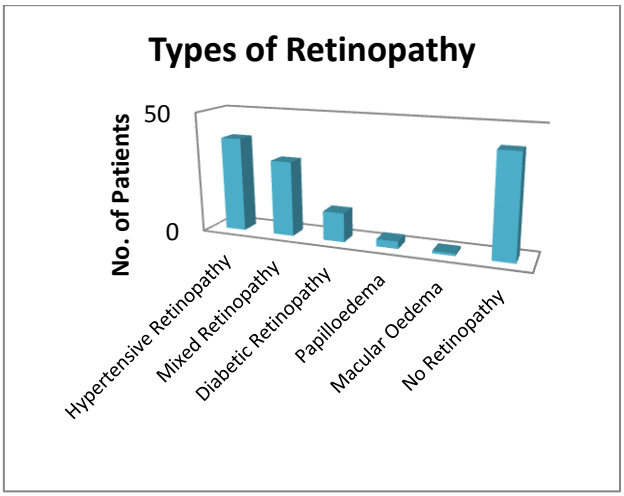

Fig.4 Type of Retinopathy

Discussion

The Global Burden of Disease 2015 study also estimated that, in 2015, 1.2 million people died from kidney failure, an increase of 32% since 2005. In 2010, an estimated 2.3–7.1 million people with end-stage kidney disease died without access to chronic dialysis.[18,19]

In 2010, 2.62 million people received dialysis worldwide and the need for dialysis was projected to double by 2030.[19]

In an Indian population-based study of two major cities Delhi and Chennai, the researchers found that CKD as broadly defined is evident in 8.7% of the adult population.[20]

In our study mean age of the patients was 34.55±12.98 years which was less than the study compared in two major cities Delhi and Chennai by S.Anand et al (2015).[20]

Hypertensive retinopathy was the most common type of retinopathy followed by diabetic retinopathy in our study. The findings were comparable with study done by B.Malleswari et al (2016).[21]

Conclusion

Hypertensive retinopathy was the most common type of retinopathy found in haemodialysis patients followed by mixed type of retinopathy, diabetic retinopathy, papilloedema and macular oedema. However no retinopathy found in about one third of patients. In haemodialysis patients with retinopathy, majority had mild retinopathy. Regular screening and timely intervention might reduce the progression of retinopathy. Hence we recommend routine screening for retinopathy in haemodialysis patients. Due to small data and demographic variation among different regions of India and world more research is needed to test this hypothesis.

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Declarations

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Conflict of interest: None declared

Ethical approval: Not required

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