



AN “EYE” ON CHRONIC KIDNEY DISEASE

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ABSTRACT

Chronic kidney disease (CKD) affects multiple organ systems and eye is not an exception to this. Eye involvement can be attributed to multiple factors namely the uraemic status of the patient, direct effects of hemodialysis, or the other systemic comorbidities associated with CKD. A prospective, cross-sectional, observational study was conducted on 106 cases of CKD at a tertiary health care centre and data analysed. Common anterior segment findings included red eyes, lid oedema, xanthelasma, conjunctival pallor, pinguecula, and cataract. Retinal involvement was also seen in patients with coexisting diabetes and hypertension. Ocular status is also an indicator of the efficacy of metabolic control of the disease. Similarly an unknown case of CKD may first present with ocular complications to an ophthalmologist. This study is an attempt to assess the ocular status and complications associated with CKD.

INTRODUCTION

Chronic kidney disease (CKD) is an irreversible and progressive process which eventually results in End Stage Renal Failure (ESRF) [1]. Most common cause of CKD is diabetic nephropathy followed by hypertensive nephroangiosclerosis, primary and secondary glomerulopathies. In addition to involvement of multiple organ systems, CKD has an impact on eye also.

Noted ocular morbidity related to renal insufficiency include lid oedema, conjunctival pallor, pinguecula [2] and xanthelasma. Red eye with or without pain and irritation is also not an uncommon complication of renal failure [3]. Recurrent sub-conjunctival haemorrhage can occur due to sclerosed conjunctival vessels secondary to hypertension [4]. Superior limbic keratoconjunctivitis (SLK) is another chronic ocular inflammation reported in some patients of ESRF undergoing hemodialysis which was first described by Bradley and Alexander and later by Thygeson and Kimura [5,6]. CKD has also been established as a risk factor for cataract [7]. A rise in intra-ocular pressure (IOP) is frequently encountered in CKD patients especially those

on hemodialysis leading to glaucoma. Richard Bright in 1836 first associated renal disease with blindness [8]. Later on, it was recognised that uraemic retinitis is the manifestation of hypertension [4]. Deterioration of vision is due to worsening of hypertensive or diabetic retinopathy, ischaemic optic neuropathy and CRVO.

Ocular status is also an indicator of the efficacy of metabolic control of the disease. Similarly an unknown case of CKD may first present with ocular complications to an ophthalmologist. This study is an attempt to assess the ocular status and complications associated with CKD. It is intended to highlight the importance of ocular examination to screen patients for any visual threat so that necessary treatment or advice can be given before irreversible loss of vision occurs.

MATERIAL AND METHODS

This Prospective, Cross-Sectional, Observational study was conducted at a tertiary eye centre. All cases diagnosed having CKD including patients requiring dialysis were included in the study and written informed



consent was obtained. Proper history taking, relevant general examination and systemic examination was done. Ocular examination was performed in detail which included distance visual acuity with Snellen's chart in both eyes unilaterally followed by Best Corrected Visual Acuity, Near vision, Anterior Segment evaluation with slit lamp, intra-ocular pressure (I.O.P.) measurement (with Schiottz Tonometer & Applanation Tonometer), sac syringing and fundus examination. Hypertensive retinopathy was graded on basis of Keith & Wagener Classification [9]. Diabetic retinopathy and Macular oedema was classified on basis of Early Treatment Diabetic Retinopathy Study (E.T.D.R.S.) [10]. The institutional ethical committee approved the study protocol.

All the data obtained was presented as percentage distribution with respect to age, gender and various ophthalmologic parameters. Statistical significance was tested for all studied ophthalmologic variables between cases separated into sub-groups based on CKD stage. A Fischer's exact test was conducted for p-value, which was considered to be statistically significant when $p < 0.05$. Statistical analyses was performed using SPSS version 11.5.

RESULTS & DISCUSSION

During the study period, a total of 106 patients were included of which 83 cases (78.3%) had mild CKD, 20 cases (18.87%) had moderate CKD and 3 cases (2.83%) had severe CKD. These included 69 males and 37 females (M:F=1.9:1) with a mean age of 51.95±11.59yrs. The most common systemic association of CKD was hypertension, 51 patients(48.12%) followed by diabetes, 26 patients(24.53%). M:F ratio was 1.9:1 which tallies well with other studies [1,11] (Fig. I). It has been postulated that there is a faster rate of kidney function deterioration in males with kidney disease.

70.7% of patients had visual acuity of 6/18 or better on presentation. This was in contrast to a study by Farzan Kian-Ersi [12] et al on hemodialysis patients in which subnormal visual acuity was the most prevalent ocular disorder (47%). However, Shimmyo et al [13] described a visual acuity of 6/6 in most of the cases. It is to be stressed that a good visual acuity can't be considered as the only criteria of ocular status because patients with advanced diabetic or hypertensive retinopathy can also retain good central vision till late stages. Range of blindness due to CKD ranges from 5% to 15% during the first year of diagnosis. Also few studies suggest that if transplanted patients are followed beyond 10 years, around 38% of them go blind mostly due to posterior segment pathology [14]. In our study, cataract was the major cause of visual loss. Most common findings were conjunctival pallor (50.94%) and lid oedema (18.87%) (Fig. II). This was also found to be statistically significant by Fisher's Exact Test. Deranged renal function prevents efficient excretion of salt and water from the body, thus leading to

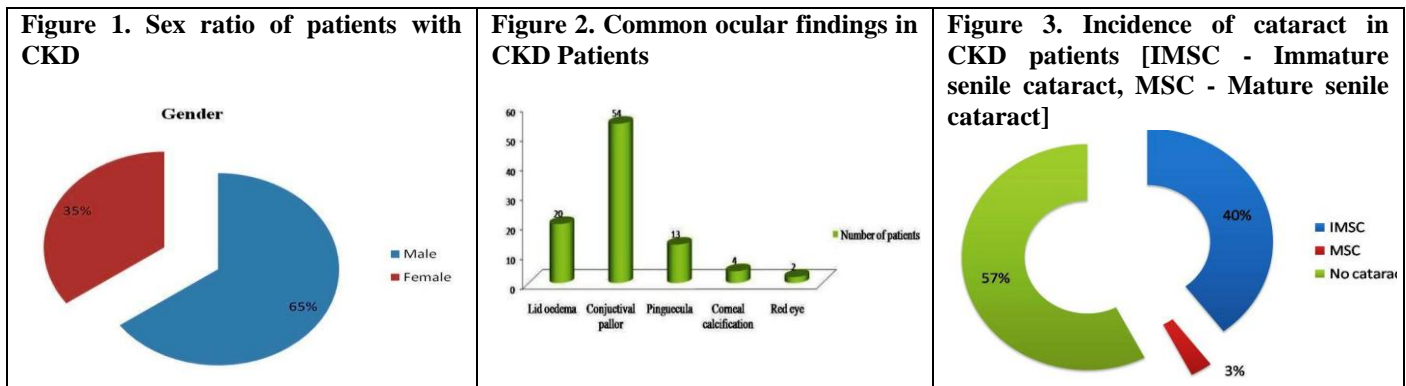
its retention. This fluid accumulation leads to generalised swelling comprising of pedal oedema, facial puffiness and lid oedema. Xanthelasma was found in 14.5% patients with no statistical co-relation. Pinguecula was found in 12.26% of patients which is in contrast to several studies report negligible incidence except for a Saudi Arabian study [12] which report a 36.7% incidence. It is said that these changes of conjunctival degeneration mostly occur from UV radiations [15] but in renal transplant patients, it is also related to hemodialysis. Calcification was seen in 3.77% of patients all having moderate CRF. It has been attributed to the secondary hyperparathyroidism associated with CRF.

There has been a large variation in incidence of calcification in different studies ranging from as low as 1.6% to as high as 60-80% [16,17]. Similar to other studies, these didn't affect vision in our patients also, deposits being present in limbal area only. Red eye was present in only two patients, one having a small sub-conjunctival haemorrhage and the other a mild allergic injection. Recurrent sub-conjunctival haemorrhage can occur due to sclerosed conjunctival vessels secondary to hypertension [4]. Some of the volatile compounds in exhaled air of renal failure patients like dimethylamine, trimethylamine, nitric oxide, and hydrogen peroxide can induce chronic reactive inflammatory response over an extended period of time [18] leading to red eye.

Cataract was present in 45 cases (42.45%) out of which 42 had immature and 3 had mature cataract (Fig. III). Cataractogenesis in CKD occur due to urea trapped in lens and due to hypocalcemia in punctate cataract, particularly in patients undergoing hemodialysis [19,20]. None of the patients had IOP >20mm Hg. It has been said that IOP may vary slightly during hemodialysis, the exact mechanism of variation in IOP is not known. Decrease in IOP during hemodialysis is attributed to plasma-colloid osmotic pressure. An Italian study [21] revealed an average IOP of 14.9±2 mm Hg in CRF patients compared to 15.6±1.9 mm Hg in controls.

In posterior segment, hypertensive retinopathy was found in 45.28% of patients. Severity of retinopathy also increased with severity of disease process which was attributed to associated increase in the blood pressures of these patients. This was consistent with other studies [22,23]. Hypertensive retinopathic changes are particularly severe in CRF due to effects of retained nitrogen products [24]. Accelerated hypertension may result in optic disc edema [25]. 96.15% of total diabetics in the study had diabetic retinopathy all in the non-proliferative group, again the higher grades of CRF showing higher grades of retinopathy. This is in conjunction with previous studies [26-29]. No case of retinal detachment or vitreous haemorrhage was encountered, in contrast to some case reports. Ophthalmic appearance is of great value in determining the efficacy of anti-hypertensive therapy [30]. Retinopathy is often asymptomatic in its most treatable stage and delay in diagnosis can cause increase in risk of visual loss [31].





RECOMMENDATIONS

1. Hypocalcaemia in renal failure should be vigorously treated to prevent the development of cataract.
2. Regular fundus examination should be carried out 6 monthly to abort any retinopathy at its inception before irreversible damage occurs.
3. Any visual impairment in CKD patients shouldn't be ignored and immediate ophthalmic consultation should be done so that cause can be ascertained and treatment given.

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