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ORIGINAL ARTICLE

Correlation of Iron Profile with Different Stages of Chronic Kidney Disease in Children Presenting at a Tertiary Care Hospital

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ABSTRACT

Aim: To determine correlation of iron profile in children with different stages of chronic kidney disease (CKD) presenting to tertiary care hospital.

Methodology: A total of 81 children with chronic kidney disease stage having glomerular filtration rate (GFR) less than 90 (ml/min/m^2) aged 1 – 14 years of either sex were included. Three ml serum sample was taken in vial by hospital duty doctor for serum ferritin level, serum iron, transferrin saturation and total iron binding capacity. The sample was sent to hospital laboratory for reporting. Iron profiling was done evaluating hemoglobin (g/dl), serum iron (ug/dl), serum ferritin (ng/ml), transferrin saturation (%) and total iron binding capacity (ug/dl) while iron load was defined as serum ferritin levels above 300 ng/ml. Correlation of iron profile with different stages of CKD was determined applying one-way analysis of variance (ANOVA).

Results: In a total 81 children, 46 (56.8%) were boys while overall mean age was 7.79±2.30 years. Mean duration on hemodialysis was 11.52 ± 9.97 months. Iron overload was observed in 26 (32.1%) children. Significant association of age above 7 years (p=0.031) and residential status as rural (p=0.017) was noted with iron overload whereas iron overload was increasing with increase in stages of CKD (p=0.002). Hemoglobin levels decreased significantly with increase in stages of CKD (p<0.001). Serum iron levels increased significantly with increase in the CKD stages (p=0.039). Serum ferritin levels were increasing significantly with the increase in CKD stages (p=0.031). Transferrin saturation also increased significant with increase in CKD stages (p=0.027).

Conclusion: High frequency of iron overload was noted in children with CKD on maintenance hemodialysis and there was linear relationship with stages of CKD and iron overload. Significant correlation of hemoglobin, serum iron, serum ferritin and transferrin saturation was observed with different stages of CKD.

Keywords: Iron overload, maintenance hemodialysis, ferritin level.

INTRODUCTION

Chronic kidney disease (CKD) is defined as structural and functional abnormalities of kidney with or without decreasing GFR leading to kidney damage for more than or equal to 3 months with features such as; Abnormalities in composition of blood or urine, abnormalities in imaging test and abnormalities on kidney biopsy.[1] CKD may be caused by congenital, inherited, metabolic or acquired abnormalities[2]. CKD in children <5 year is caused by congenital abnormalities such as hypoplasia, dysplasia or obstructive uropathy, congenital nephrotic syndrome, prune belly syndrome, cortical necrosis, focal segmental necrosis, autosomal recessive polycystic kidney disease, renal vein thrombosis and hemolytic uremic syndrome[3,4]. Acquired causes include various forms of glomerulonephritis and manifested after 5 years of age. Inherited disorders include Familial juvenile nephronophthisis and Alport syndrome while CKD related to metabolic disorders is caused by cystinosis and hyperoxaluria[4]. Main manifestations of CKD include growth failure, metabolic acidosis, anemia, mineral bone disease and hypertension[5]. Regular packed red cells transfusions eliminate the complications of anemia and compensatory bone marrow expansion[3]. Repeated transfusion deposit the iron in body as one unit of blood contains about 200mg iron (PCV 1ml=0.7mg iron, whole blood 1ml=0.35mg iron)[2,3]. Saturated iron with transferrin is non-toxic to tissues. When 60-70% transferrin saturation is achieved, free iron called non-transferrin bound iron (NTBI) is taken by tissues, which is highly toxic due to free radical formation[3,6].

Iron overload can lead to serious morbidities including cardiac disease, cirrhosis, diabetes, hypothyroidism and hyperparathyroidism. Iron chelation therapy is used to decrease the morbidity and mortality in chronic kidney disease patients[7]. Available iron chelators are Desferrioxamine (IV), Deferiprone (Oral) and Deferasirox (Oral)[5]. Desferrioxamine has been used as the first line drug for chelation uptil now. It is a parenteral drug used 5-6 times a week for effective iron chelation.[8] Because of parenteral route of administration, the compliance is poor. Deferiprone is an oral iron chelator given three times daily whereas Deferasirox is claimed to be a promising new oral iron chelator used in once daily dosage[8]. Its efficacy is said to be similar to that of Desferrioxamine[9,10]. In a study on hemodialysis done at Sudanese patients in 2017 by Khidher ibrahim, it was found that mean serum ferritin in hemodialysis patients was 521.8[11]. In another study conducted in France by Department of Medical Technology

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