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Effect of bore well water obtained from villages in the North Central Province (NCP) with high prevalence of Chronic Kidney Disease (CKD) on renal function in rats

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Regional clustering of CKD patients is found in the NCP of Sri Lanka. According to a questionnaire based study consumption of unboiled water and the duration of consumption of water has a significant association with CKD ($p \leq 0.05$). The objective of this study was to determine if maintenance on bore well water obtained from these sites leads to renal dysfunction in Wistar rats. Wistar rats (n=40) were divided into four groups. Three groups were administered water from bore wells used as drinking water by CKD patients in the NCP. The control group was given tap water obtained from Colombo. Glomerular and tubular function was monitored by common biochemical tests and Glomerular Filtration Rate (GFR). Urine samples were tested using dipsticks at monthly intervals. GFR was measured every three months. GFR was lower in all three test groups compared to the controls. The GFR of rats maintained on water from Divuldamana was 1.40± 0.40 ml/min/kg, 2.9±1.40 ml/min/kg and 2.52±0.86 ml/min/kg at 6, 9 and 12 months, respectively. The corresponding values in the controls were 2.89±2.16 ml/min/kg, 4.09±1.37 ml/min/kg and 3.10±0.85 ml/min/kg, respectively. The decrease in GFR was statistically significant only in rats maintained on water from Divuldamana, at 6 months ($p \leq 0.05$) and 9 months ($p = 0.006$). Urinary protein levels were 100-300 mg/dL in all four groups. Urinary β2 globulin measured after eight months was <4 ng/mL in the experimental and the control groups, indicating an absence of tubular damage. Serum creatinine, urinary urobilinogen, glucose, bilirubin, ketones, specific gravity, RBCs, pH, nitrite and leucocytes were within normal in all groups. Diminishing GFR is an early indicator of glomerular damage. Maintenance on bore well water from Divuldamana leads to diminished renal function in Wistar rats.

Keywords: CKD, Wistar rats, GFR, NCP

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