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Genotoxicity evaluation in chronic renal patients undergoing hemodialysis and peritoneal dialysis, using the micronucleus test

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ABSTRACT. Patients with chronic renal disease have an increased incidence of cancer. It is well known that long periods of hemodialysis treatment are linked to DNA damage due to oxidative stress. This genotoxic effect may cause the loss of chromosome fragments, or even entire chromosomes, which form micronuclei after cell division, and can be detected by the micronucleus test. In the present case-control study, we evaluated the genotoxic effect of hemodialysis treatment in 20 patients undergoing hemodialysis, and 20 subjected to peritoneal dialysis, matched for gender and age with 40 controls. Genetic damage was assessed by examining the frequency of micronuclei in 2000 exfoliated buccal cells per individual. Our results revealed that patients undergoing hemodialysis treatment have a significantly higher frequency of micronucleated cells (MNC; 5.60 ± 5.31) compared to control subjects (1.50 ± 2.01, $P < 0.01$). Interestingly, the same was not observed for the peritoneal dialysis patients who showed no significant differences in MNC (2.85 ± 2.96) frequency compared to control individuals (3.25

± 3.85). In addition, we evaluated the possible association between creatine levels, smoking, alcohol intake, age, duration of treatment, and incomes of the individuals (separately analyzed according to their gender) and the frequency of micronuclei. The results reported here indicate that the duration of treatment is the only factor associated with increased MNC frequency among hemodialysis patients (Spearman coefficient of 0.414, $P = 0.01$). The number of MNC found in individuals with six years or less of treatment was significantly lower (2.91 ± 2.74) compared to patients with seven or more years of treatment (8.89 ± 5.96, $P < 0.05$). Overall, peritoneal dialysis may be a safer choice of treatment, but further studies need to be performed to investigate the risks and benefits of both treatments.

Key words: Micronucleus; Mutagenicity; Peritoneal dialysis patients; Hemodialysis patients; Chronic renal disease

