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EFFECT OF CALCIUM AND MAGNESIUM HIGH CONTENT IN HARDNESS DRINKING WATER ON KIDNEY FUNCTIONS

Roman Aizman, Svetlana Nedovesova and Eugene Trofimovich

Novosibirsk State Pedagogical University, Russia

The effects of prolonged consumption of hardness drinking water with increased content of Mg^{2+} and Ca^{2+} on renal functions in rats were studied. The experiments were performed on Wistar male rats of 3 groups: control (C) (Ca^{2+} -10 mg/L and Mg^{2+} -5 mg/L), and experimental – E1 (Ca^{2+} -120mg/L) and E2 (Mg^{2+} -60mg/L). At the 1-st, 2-d, 4-th and 6-th months of water intake in rats the urine and blood samples were collected before (background) and after a 5% water load. The concentrations of Na^+ , K^+ , Ca^{2+} , Mg^{2+} , urea, osmolality and hormones (corticosterone, T3 and T4) were determined. It was shown that both experimental groups an activation of osmoregulatory renal function compared with the control have manifested, that was to reduce urine output by increasing of fluid reabsorption, the osmolality of the urine, the excretion of Ca^{2+} and reducing potassium and magnesium excretion. The output of Na^+ , urea practically did not differ between groups. Drinking water in group E2 caused more significant changes in renal function than water in group E1. After the water loading differences in renal response between the groups were not expressed, especially to the 6-th month, indicating a decrease in the level of stress of the osmotic and ion - regulating mechanisms after hydration. The concentration of the described ions in plasma did not differ between groups, and the content of the main stress hormones (corticosterone, thyroxine, triiodothyronine) responsible for adaptive adjustment of the organism by the end of the observation was significantly lower than in the group C, which is likely to indicate a manifestation of a stress reaction to hardness drinking water with its subsequent depletion. Thus, long-term intake of drinking water with high content of Mg^{2+} and Ca^{2+} causes adaptive adjustment of hormonal and renal responses, the value of which depends on the concentration of ions in the water and the consumption time duration.

BIOGRAPHY

Roman Aizman has got his Doctor degree from Moscow Research Institute of Developmental Physiology in 1985. He is the head of the dept. of Human Anatomy, Physiology and Life Safety, director of the Scientific Research Institute of Health and Safety, professor of Novosibirsk State Pedagogical University, Russia. He has over 700 publications that have been cited over 3900 times, and his publication H-index is 26.

aizman.roman@yandex.ru