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SOME BIOLOGICAL RISKS IN RATS AS A RESULT OF COOKING IN ALUMINUM UTENSILS

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ABSTRACT

The effects of cooking and / or storage for 7 days of fresh green peas using aluminum kitchen utensils at three different pH values with or without adding sodium chloride in comparison with stainless steel utensils were examined. Biological demonstration in rats revealed the effects of consuming aluminum contaminated diet on hematological measurements RBC's, WBC's, platelets counts and erythrocyte indices. Further more the biochemical changes in blood hemoglobin, hematocrit, and the levels of serum iron, calcium and aluminum, as well as the oxidative stress status and tibia characteristics were also investigated. The results showed that using aluminum utensils at acidic medium significantly increased aluminum concentrations in cooked and / or stored peas samples by about 11.5% and 18.7% , respectively, while adding NaCl dose,.3g/20g peas resulted in progressive increment reaching 14.45% and 26.9% respectively. The levels of aluminum were also elevated markedly in the stored samples with or without adding NaCl in both neutral and alkaline medium, while it's increment ranged between 4 to 5% in cooked samples in case of adding NaCl or not. Aluminum accumulation decreased hematological measurements due to its toxic effects. The decrease of hemoglobin and hematocrit reached 30.0% and 8.36%, respectively, accompanied by decreasing the levels of iron and calcium in serum by about 6.35% and 18.3%, respectively. In contrast, there was 21% elevation in serum aluminum concentration which significantly lowered the antioxidant mechanisms as shown in plasma level of malondialdehyde (5.76 ± 0.24 nmol/ml) as compared to (1.64 ± 0.10 nmol/ml) associated with decreased level of erythrocytes super oxide dismutase by about 19.4%.Tibia characteristics showed a significant increase in weight and density as aluminum accumulation with calcium demineralization at the end of the experiment (12 week). It could be concluded that aluminum leaching from aluminum utensils, especially during storage of acidic foods, in hematological measurements and its physiological function roles also, will cause undesirable changes in oxidative stress and bone dysfunction.

Keywords: Aluminum- Utensils- Rats- Cooking-Oxidative stress-blood indicies

INTRODUCTION

There are many pots materials that are available for use in home cooking either metals such as stainless steel, aluminum, tefal coated layer and copper which coated in with inner core or non-stick teflon, porcelain and pyrex *(Marion 1985)*. Many investigators studied the effects of aluminum migration from utensils and tools into foods, water and beverages as well as factors affecting the leaching amount such as chemical constituents of foods, the pH of cooking medium, duration and temperature of cooking and storage periods as complex reactions that result in dissolution of complexes metals, *(Gaballa 2000, Scancar et al 2004, Diab 2005, Mohamed 2006)*. Aluminum is the most common material metal used in food preparation in houses, restaurants kitchen tools and utensils as low coast, hard work, and a good