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**PROBABLE ROLE OF FLUORIDE AND ALUMINIUM IN THE
INCIDENCE OF CHRONIC RENAL FAILURE IN
ANURADHAPURA DISTRICT**

A THESIS PRESENTED BY

K. R. P. K. HERATH

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ABSTRACT

PROBABLE ROLE OF FLUORIDE AND ALUMINIUM IN THE INCIDENCE OF CHRONIC RENAL FAILURE IN ANURADHAPURA DISTRICT

K.R.P.K.Herath

Postgraduate Institute of Science

University of Peradeniya

Peradeniya Sri Lanka

While the etiology of the chronic renal failure in the Medawachchiya-Padaviya areas still remains a mystery, some results on the geo-environmental factors of the region reveal some significant findings. A chance discovery made during field studies was that people exclusively use aluminium utensils and some holes were observed in these utensils after continuous use. Water used by these people mostly come from dug wells and they generally have high fluoride content in the range 1.00-4.00 ppm with a median of around 2.0 ppm. Fluoride ions of drinking water and the direct link to chronic renal failure have been reported by many researchers.

In this study pieces of aluminium from a used aluminium pot were treated with water containing fluoride at different levels of 1.0-6.0 ppm with/ without tomato, tamarind, and tartaric solutions. After 10 minutes of boiling, the amounts of aluminium and lead leached were measured. The amount of aluminium and lead leached from the chips were corrected with simulated food solution in a sauce pan. The amount of aluminium leached out in the presence of 3.0 ppm of fluoride (simulated food solution) were 4.65 ppm, 28.45 ppm, 157.22 ppm, and 233.18 ppm in deionized water, tomato, tamarind, and tartaric mediums respectively whereas, amount of leached Pb was 0.60 ppm, 2.37 ppm, 3.56 ppm, and 9.22 ppm respectively. In an acidic medium, there was more than ten-fold increase in the dissolution of aluminium. This experiment was performed owing to the widespread use of acidic ingredients like tomatoes, tamarind, and vinegar which are used for cooking and the use of inferior quality aluminium pots for cooking.

Aluminium leaching under high fluoride stress and acidic spices results in the formation of aluminofluoride complexes which alter the normal metabolic activity of the body. Stable complexes like AlF_3 and AlF_4^- act as phosphate inhibitors, which can potentially lead to dysfunction in biological systems. The origins of many human diseases are in the functioning (and malfunctioning) of signaling components. The observation of both fluoride and aluminium intake amongst the affected patients gives further credence to the hypothesis that aluminium and fluoride in combination could be a possible reason for the occurrence of chronic renal failure in areas with high fluoride content.