Immunohistochemical Study of Aging Rat Brain – Effect of High Aluminium and Restricted Calcium in Diets

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Abstract

Certain environmental factors which accumulate slowly with age could be associated with the pathogenesis and/or progression of neuro-degenerative disorders with associated cytoskeletal abnormalities in neuronal cells. In aluminum (Al) induced encephalopathy, abnormally high phosphorylation states of the neurofilament proteins affect crucial interactions between the cytoskeletal components leading to disruption of integrity of architecture. Dietary factors such as deficiency of micronutrients viz iron, magnesium and calcium have been implicated to favor Al absorption and accumulation in the body and contribute towards the etiopathology of Al associated neurological disorders. Therefore, this study was conducted to examine any alteration in the neuronal cytoskeletal components which could arise due to chronic feeding of moderately high levels of Al to experimental rats maintained on low dietary calcium in their diets. This situation simulates the one found in India where Al vessels are commonly used for cooking and storing food and intake of calcium is well below the optimum. The high number of neurofibrillary tangles found mainly in the substantia nigra region in the brains of rats fed moderately high levels of Al merits attention. It also throws light on the contribution of dietary aluminium in the causation of neurotoxicity at the cellular level.

Key words: Aluminium, Cytoskeletal proteins, Low calcium diet, Neurodegeneration, Neuropathology