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Serrapeptase and nattokinase intervention for relieving Alzheimer's disease pathophysiology in rat model

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Abstract

Serrapeptase (SP) and nattokinase (NK) are proteolytic enzymes belonging to serine proteases. In this study, we hypothesized that SP and NK could modulate certain factors that are associated with Alzheimer's disease (AD) pathophysiology in the experimental model. Oral administration of aluminium chloride (AlCl3) in a dose of 17 mg/kg body weight (bw) daily for 45 days induced AD-like pathology in male rats with a significant increase in brain acetylcholinesterase (AchE) activity, transforming growth factor β (TGF-β), Fas and interleukin-6 (IL-6) levels. Meanwhile, AlCl3 supplementation produced significant decrease in brain-derived neurotrophic factor (BDNF) and insulin-like growth factor-1 (IGF-1) when compared with control values. Also, AlCl3 administration caused significant decline in the expression levels of disintegrin and metalloproteinase domain 9 (ADAM9) and a disintegrin and metalloproteinase domain 10 (ADAM10) genes in the brain. Histological investigation of brain tissue of rat model of AD showed neuronal degeneration in the hippocampus and focal hyalinosis with cellular as well as a cellular amyloid plaques formation. Oral administration of SP or NK in a rat model of AD daily for 45 days resulted in a significant decrease in brain AchE activity, TGF-β, Fas and IL-6 levels. Also, the treatment with these enzymes produced significant increase in BDNF and IGF-1 levels when compared with the untreated AD-induced rats. Moreover, both SP and NK could markedly increase the expression levels of ADAM9 and ADAM10 genes in the brain tissue of the treated rats. These findings were well confirmed by the histological examination of the brain tissue of the treated rats. The present results support our hypothesis that the oral administration of proteolytitc enzymes, SP and/or NK, would have an effective role in modulating certain factors characterizing AD. Thus, these enzymes may have a therapeutic application in the treatment of AD.

Keywords: Alzheimer's disease; nattokinase; proteolytic enzymes; rats; serrapeptase.

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