

Evaluation of Extract of *Cajanus cajan* (L.) Millsp. Root on Improvement of Learning and Memory

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Abstract

By 2018, 18% of Taiwan's population aged 65 years or older, indicating a transition into a super-aged society. Epidemiological studies report that approximately 1.7-4.4% of the elderly population is affected by dementia, most commonly Alzheimer's disease (AD). Currently, the majority of approved pharmacological treatments for AD are acetylcholinesterase (AChE) inhibitors; however, these drugs are associated with adverse side effects and provide only symptomatic relief rather than disease modification. Therefore, diet-based preventive strategies may help to reduce both disease burden and healthcare costs.

One dietary approach involves phytoestrogens, which may offer neuroprotection without the risks of conventional estrogen therapy. Estradiol (E2) binds non-specifically to both ER α and ER β ; ER α activation in breast/ uterine tissues can lead to cancer. In contrast, isoflavones are phytoestrogens with higher affinity for ER β and function as selective estrogen receptor modulators. They can reduce AD risk without any side effects of E2 by activating ER β . Our previous studies demonstrated that the ethanol extract of *Cajanus cajan* (L.) Millsp., (Pigeon Pea) roots (EECR) exhibit strong antioxidant, anti-glycation, antibacterial, and anti-inflammatory activities, and is rich in phytoestrogens (PE). Among these, genistein is present in the highest amount, accounting for about 2% of the pigeon pea root. This study evaluated whether EECR, administered at low (20 mg/kg) and high (100 mg/kg) doses, could prevent D-galactose (D-gal)-induced learning and memory impairment in an aging mouse model. Cognitive performance was assessed using the Morris water maze and active avoidance tests. EECR treatment significantly improved D-gal-induced deficits, as shown by reduced escape latencies in the water maze and shorter latencies to avoid electric shocks ($p < 0.05$). These results indicate that EECR has promising potential as a dietary supplement for preventing AD-related cognitive decline.

Index Terms

Alzheimer's Disease, Learning And Memory, *Cajanus cajan* (L.) Millsp. Root, Phytoestrogens, Selective Estrogen Receptor Modulators