Diabetes mellitus produces numerous neurophysiological and structural changes in the brain and it is associated with moderate cognitive deficits. The etiology of diabetes associated cognitive decline is multifactorial and involves insulin receptor down regulation, neuronal apoptosis and glutamatergic neurotransmission. The study was designed to evaluate the impact of EGCG on cognitive function and neuroinflammatory cascade in streptozotocin-induced diabetes.

Streptozotocin-induced diabetic rats were treated with EGCG (25, 50 & 100 mg/kg, orally) or with vehicle for 10 weeks. Morris water maze was used for behavioral assessment of memory. Cytoplasmic and nuclear fractions of cerebral cortex and hippocampus were prepared for the quantification of acetylcholinesterase activity, oxidative-nitrosative stress (lipid peroxidation, superoxide dismutase, catalase, non protein thiols, total nitric oxide), tumor necrosis factor-alpha (TNF-α), interleukin-1beta (IL-1β), p56 subunit of NFκβ and caspase-3.

After 10 weeks of steptozotocin injection, the rats produced significant increase in transfer latency which was coupled with enhanced acetylcholinesterase activity, increased oxidative-nitrosative stress, TNF-α, IL-1β, caspase-3 activity in cytoplasmic lysate and active p65 subunit of NFκβ in nuclear lysate of cerebral cortex and hippocampus regions of diabetic rat brain. Interestingly, co-administration of EGCG significantly and dose-dependently prevented behavioral, biochemical and molecular changes associated with diabetes. Moreover, diabetic rats treated with insulin-EGCG combination produced more pronounced effect on molecular parameters as compared to their per se groups.

Collectively, the data reveal that activation of NFκβ signaling pathway is associated with diabetes induced cognitive impairment and point towards the therapeutic potential of EGCG in diabetic encephalopathy.