Myrtus communis subsp. communis improves cognitive function in postmenopausal diabetic rats: effects on acetylcholinesterase activity

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Introduction

Menopause and diabetes are two independent risk factors for the occurrence of neurologic diseases in life (1). Various evidence induce that estrogen deficiency exacerbates the risk of diabetes and associated complications. Alterations in diabetic-related cholinergic enzymes indicate deterioration in acetylcholine-mediated learning and memory. It has also been noted by many studies that an increase in cognitive impairment due to estrogen-level postmenopausal decline is also noted. Hippocampal brain derived neurotrophic factor (BDNF) levels are the critical factor for cognitive functioning. Improvement in postmenopausal diabetes–induced cognitive deficits may be attributed to their influence on the expression of BDNF which levels decrease as an early marker of Alzheimer’s disease. A decline in estradiol levels in women on menopause leads to reduction of estrogen-induced BDNF synthesis in the hippocampus (2).

These results showed that both estrogen deficiency and diabetes lead to memory impairment in female rats. MC extract has improved cognitive functions in postmenopausal diabetic rats compared to diabetes group.

Results

Evaluation of blood glucose and estradiol

- The animals evaluated for their performance in the new object recognition test.
- Blood glucose and estradiol levels examined in serum samples.

Amyloid-β and BDNF activity

- Acetylcholinesterase (AChE) levels were analyzed in hippocampal tissue.
- Cholineacetyltransferase (ChAT) activity

Discussion & Conclusion

- According to our results; in the OVT+D groups AChE and ChAT levels in the hippocampus were significantly decreased while treatment with MC, E2, Donepezil markedly reversed these changes induced in OVT+D rats [p<0.05-0.001].
- New object exploration was significantly higher than familiar object exploration in control rats. As expected, OVT, D and OVT+D rats induced a significant reduction in discrimination indices compared to controls. Treatment with MC prominently increased discrimination index in OVT+D rats [p<0.001].
- These results showed that both estrogen deficiency and diabetes lead to memory impairment in female rats. MC extract has improved cognitive functions in postmenopausal diabetic rats. Thus MC extract may be beneficial in postmenopausal diabetic women with its positive effects on glycemic and neural function.

References