

Napatr Sriraksa. 2011. **Neuroprotective effect of Quercetin against Parkinson's like symptoms induced by 6-Hydroxydopamine in Rats.** Doctor of Philosophy Thesis in Neuroscience, Graduate School, Khon Kaen University.

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### **ABSTRACT**

Parkinson's disease (PD) is a second most neurodegenerative disease after Alzheimer's disease. This condition produces great impact on both social and economic aspects. Generally, PD is usually observed in after 65 years old. The degeneration of dopaminergic neurons in nigrostriatal pathway can produce both motor and non-motor disorders such as learning and memory impairment. At present, the precise underlying mechanism of neurodegeneration in PD is still unclearly known. However, piles of scientific evidence point out that oxidative stress is one of the important factors. The therapeutic efficacy of drugs used nowadays which targets at increasing dopamine level is still limited. It usually produces side effect and the drug response is not stable after prolonged treatment. Thus, the development of therapeutic strategy from substance possessing antioxidant activity is still essential. So the current study aims to determine the protective effect against memory impairment and motor disorders of quercetin, a flavonoid possessing antioxidant activity which is commonly found in fruits and vegetables, in animal model of Parkinson's disease.

Adult male Wistar rats were orally administered various doses of quercetin ranging from 100, 200 and 300 mg/kg BW once daily at a period of 14 days before and 14 days after the induction of PD symptoms by injecting 6-OHDA into right substantia nigra. Then, they were determined spatial working memory by using Morris water maze test and determined motor changes by using elevated body swing test and rotational behavior test. The results showed that quercetin could enhance

memory and could mitigate motor disorders. The possible underlying mechanism may occur via the reduction of oxidative stress including the elevated superoxide dismutase (SOD), glutathione peroxidase (GPx) and catalase (CAT) and the increased survival neuron densities in hippocampus and substantia nigra. In addition, it also increased the dopaminergic neuron in substantia nigra. The data obtained from this study suggested that the cognitive enhancing effect might occur via the enhanced cholinergic function in hippocampus.

This study also determined the protective effect of transdermal quercetin-loaded nanofiber patch against memory impairment and motor disorder. The rats were received quercetin nanofiber patch via transdermal route at a period of 14 days before and 14 days after 6-OHDA injection and they were determined the same parameters as those mentioned in the determination neuroprotective effect of quercetin via oral route. The results showed that quercetin-loaded nanofiber patch could also mitigate memory and motor impairments. The possible underlying mechanism may be similar to that of quercetin that administered via oral route. Interestingly, the effective dose of transdermal quercetin-loaded nanofiber is less than that of the oral route approximate 100 times.

In conclusion quercetin has the potential to be developed as cognitive enhancer and as the agent to reduce motor disorder in animal model of Parkinson's disease. Anyway, further researches are still required.