The effect of Boophone disticha on the regulation of BDNF gene expression in Balb/c mouse model of depression

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Introduction: The mental disorder of depression is predicted to be the foremost disabling heterogeneous condition the earth. As a complex disease, depression can be characterized by combinations of genetic and environmental factors. The brain-derived neurotrophic factor (BDNF) is one of the most studied neurotrophic factors responsible for maintaining neurons and regulating synaptic plasticity. Strong evidence has linked BDNF to depression; it has been observed by various independent researchers that the expressions of BDNF levels are low in depressed patience/animal models. This is in contrast to a notable up-regulation in BDNF expression in response to treatment by antidepressants. Also, epigenetic modulation of BDNF gene and its receptor TrkB has been shown to alter BDNF expression. With the current adverse side effects of antidepressants, alternative interventions with few side effects are required. *Boophone disticha* is a ubiquitous plant widely used by indigoes people to treat ailments such as depression and anxiety. The leaves of the plants contain alkaloids which have high affinity for selective serotonin reuptake inhibitors (SSRI) site of the transporter of serotonin (SERT). Therefore, the study aimed to investigate the effects of *Boophone disticha* on genes that are biomarkers of depression as a way of gaining insight into their regulation.

Methodology: Brain tissue from depressed Balb/c mouse models were used to study the gene expression of five (5) promoters of BDNF and HDAC5 by RT-qPCR with non-gavage being the control group of the study. The expression was measured in relation to GAPDH. ELISA and western blot were used to evaluate the protein expression in response to treated with *B. disticha*, fluoxetine, and untreated (non- gavage) brain tissues from the depressed model. Furthermore, methylation specific PCR (MS-PCR) was used to assess the regulation and/ or the methylation status of promoter 4 of BDNF as it is known to be regulated by epigenetics.

Results & Discussion: The results obtained indicated that fluoxetine (currently prescribed antidepressant) treated mice successfully expressed BDNF which was upregulated, gene and protein levels. While the 50% methanol and 50% water leaf extracts of *B. disticha* treatment was also successful in up-regulating BDNF in comparison to the non- gavage although, it did not have a similar effect to fluoxetine. The ability of *B. disticha* to increase BDNF lays the foundation for future work, wherein combination therapy in the presence of the plant extract can be explored as a possible antidepressant discovery study. A combination of *B. disticha* and overexpressed BDNF might be a powerful for treatment of depression.

References:

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Keywords: Depression, BDNF, Epigenetic regulation, antidepressants, ELISA and RT-qPCR