PROGRAMME BOOK

MSBMB 46

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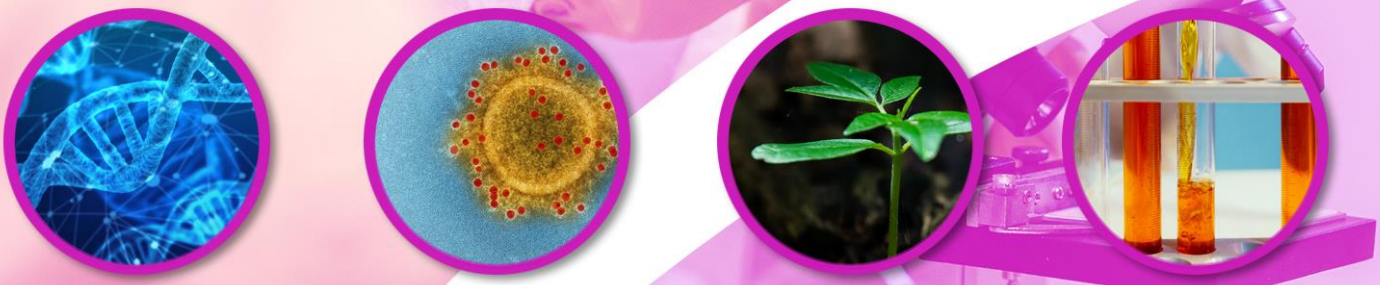
"Advancement of Biochemistry and Molecular Biology in the Digital Era"



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THE AMELIORATIVE EFFECTS OF TUALANG HONEY MEDIATED SILVER NANOPARTICLES ON HIPPOCAMPAL DAMAGES FOLLOWING KAINIC ACID ADMINISTRATION IN MALE RATS

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Kainic acid (KA) was shown to be associated in the mechanism of excitotoxicity-induced neurodegeneration in the brain. Tualang honey (TH) was reported to have protection against neurodegeneration but no study has explored on its silver nanoparticles (THSN). Therefore, present study aimed to investigate the effects of THSN on glutathione status and hippocampal histology in KA-induced rats. Sprague-Dawley rats (n=42) were divided into seven groups such as control, THSN 10 mg, THSN 50 mg, KA alone, THSN 10 mg + KA, THSN 50 mg + KA and Topiramate + KA, and each group were pretreated orally with either distilled water, THSN (10 mg/kg or 50 mg/kg) or Topiramate (40 mg/kg), respectively, five times at 12 h intervals. Saline or KA (15 mg/kg body weight) were injected subcutaneously 30 min after last oral treatment. All animals were sacrificed 24 h post KA injection and the hippocampus was harvested for histological examination using cresyl violet staining. The reduced glutathione (GSH) and oxidized glutathione (GSSG) was determined using commercially available ELISA kits. The significant ($p<0.05$) decrease in the level of cresyl violet-positive cells in hippocampal CA3 in KA alone group was ameliorated by THSN (10 mg/kg) pretreatment group. Meanwhile, the KA-induced reduction in GSH:GSSG ratio in KA alone group was significantly ($p<0.05$) increased by both doses of THSN pretreatments. In conclusion, THSN showed potential protective effects by improving the glutathione status and reduce hippocampal cells injury in the rats after KA-induced.

Keywords: Silver nanoparticles, rat hippocampus, kainic acid, glutathione, cresyl violet

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❑ INTRODUCTION

Green synthesis of nanoparticles using plant-mediated process has been used for therapeutic and diagnostic purposes [1]. Recently, researchers have develop nanoparticles that can cross the blood-brain barrier [2]. Glutathione (GSH) is the most abundant antioxidant intracellular thiol in the brain [3]. It reacts with free radicals and protects cells from singlet oxygen, hydroxyl radical, and superoxide radical damage [3]. Tualang honey (TH), a potential natural antioxidant agent, has been shown to protect against neurodegenerative disorders [4,5]. Therefore, the present study aimed to explore the ameliorative effects TH mediated silver nanoparticles (THSN) on glutathione status and hippocampal histology in kainic acid (KA)-induced rats.

❑ METHODOLOGY

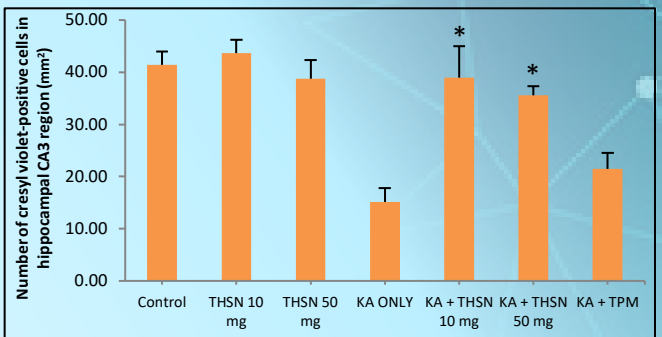
Sprague Dawley male rats (n=42) were randomly divided into seven groups:

- Group (1): control
- Group (2): THSN 10 mg
- Group (3): THSN 50 mg
- Group (4): KA only
- Group (5): THSN 10 mg + KA
- Group (6): THSN 50 mg + KA
- Group (7): TPM + KA

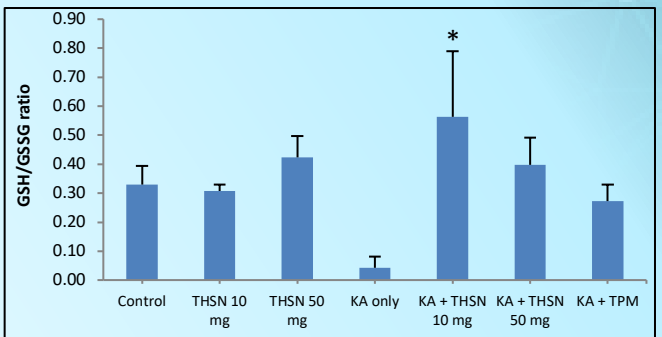
Each group were pretreated orally with either distilled water, AgNPs (10 mg/kg or 50 mg/kg) or Topiramate (TPM) (40 mg/kg), five times at 12 h intervals. Saline or KA (15 mg/kg body weight) were injected subcutaneously 30 min after last oral treatment.

All animals were sacrificed 24 h post KA injection and the hippocampus was harvested for histological examination using cresyl violet staining. The reduced glutathione (GSH) and oxidized glutathione (GSSG) was determined using commercially available ELISA kits.

❑ RESULT AND DISCUSSION



The significant ($p<0.05$) decrease in the number of cresyl violet-positive cells in KA only group was ameliorated by both doses of THSN pretreatments. *$p<0.05$ versus KA alone



The significant ($p<0.05$) decrease in the level of GSH/GSSG ratio in KA only group was ameliorated by THSN (10 mg/kg) pretreatment. *$p<0.05$ versus KA alone

It was reported that TH mediated silver nanoparticles exhibited remarkable antioxidant activity with 1,1-diphenyl-2-picrul hydrazyl and reducing antioxidant power values of 95.54 ± 0.96 (%) and 1032.30 ± 102.76 µm Fe(II), respectively [6].

The improvement in GSH status and hippocampal CA3 morphology by THSN suggested that its antioxidant properties possibly increased the brain's endogenous defence against KA-induced oxidative stress.

❑ CONCLUSION

THSN showed potential protective effects by improving the glutathione status and reduce hippocampal cells injury in the rats after KA-induced.

❑ ACKNOWLEDGEMENT

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