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PROGRAMME & ABSTRACT BOOK

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Green Synthesis of Silver Nanoparticles by Tualang Honey Modulating Hippocampal Glutathione in Kainic Acid-Induced Seizure in Male Rats

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Abstract

In recent years, green synthesis of nanoparticles using plant-mediated process has been an emerging research and development in the field of medicinal biotechnology. Tualang honey, a potential natural antioxidant medicinal agent, has been shown to protect against neurodegenerative disorders. Present study explored the ameliorative effects of silver nanoparticles (AgNPs) synthesized using Tualang honey on glutathione level following kainic acid (KA)−induced seizure in the rats' hippocampus. Sprague Dawley male rats (n=42) were randomly divided into seven groups such as control, AgNPs 10 mg, AgNPs 50 mg, KA alone, AgNPs 10 mg+KA, AgNPs 50 mg+KA and Topiramate+KA, and each group were pretreated orally with either distilled water, AgNPs (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 after KA injection and their hippocampus were harvested for determination the level of reduced glutathione (GSH), oxidized glutathione (GSSG) and GSH:GSSG ratio by using commercially available ELISA kits. The significant ($p<0.05$) decrease in the level of GSH in KA alone group was ameliorated by both doses of AgNPs pretreatments. Meanwhile, the elevation of GSSG level in KA alone group was significantly ($p<0.05$) reduced by the pretreatments of AgNPs 10 mg and Topiramate of KA−induced groups. Remarkably, only AgNPs 10+KA group was significantly ($p<0.05$) increases the GSH:GSSG ratio after KA induced. In conclusion, AgNPs showed potential protective effects by modulating the glutathione system in the rats' hippocampus after KA−induced.

Keywords: silver nanoparticles; Tualang honey; glutathione; kainic acid; hippocampus

3rd Bionanotechnology Seminar (BioNanoSeM 2022)

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BIONANOTECHNOLOGY RESEARCH

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GREEN SYNTHESIS OF SILVER NANOPARTICLES BY TUALANG HONEY MODULATING HIPPOCAMPAL GLUTATHIONE IN KAINIC ACID-INDUCED SEIZURE IN MALE RATS

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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 medicinal agent, has been shown to protect against neurodegenerative disorders [4,5]. Therefore, the present study aimed to explore the ameliorative effects of silver nanoparticles (AgNPs) synthesized using TH on glutathione level following kainic acid (KA)-induced seizure in the rats' hippocampus.

❑ METHODOLOGY

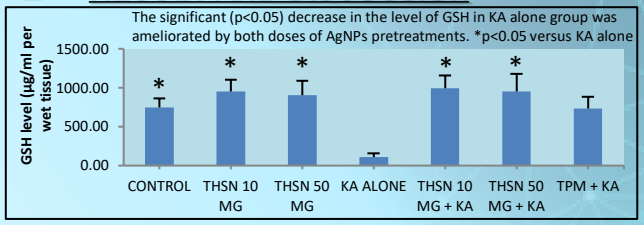
Sprague Dawley male rats (n=42) were randomly divided into seven groups:

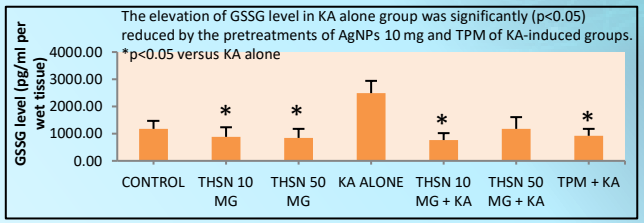
Group (1): control
Group (2): AgNPs 10 mg
Group (3): AgNPs 50 mg
Group (4): KA alone
Group (5): AgNPs 10 mg + KA
Group (6): AgNPs 50 mg + KA
Group (7): TPM + KA

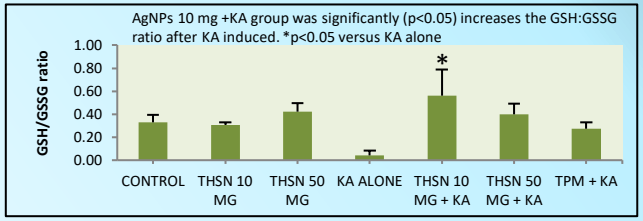
Each group were pretreated orally with either distilled water, AgNPs (10 mg/kg or 50 mg/kg) or Topiramate (TPM) (40 mg/kg), five times at 12 h intervals. Saline or KA (15 mg/kg body weight) were injected subcutaneously 30 min after last oral treatment.

All animals were sacrificed 24 h after KA injection and their hippocampus were harvested for determination the level of reduced glutathione (GSH), oxidized glutathione (GSSG) and GSH:GSSG ratio by using commercially available ELISA kits.

❑ RESULT AND DISCUSSION







It was reported that AgNPs synthesized using TH 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 system by AgNPs suggested that its antioxidant properties possibly increased the brain's endogenous defence against KA-induced oxidative stress.

❑ CONCLUSION

In conclusion, AgNPs showed potential protective effects by modulating the glutathione system in the rats' hippocampus after KA-induced.

❑ REFERENCES

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