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Neuropotential role of Taurine: Role of neurotransmitters, oxidative stress, mitochondrial dysfunctioning and histopathological evidences

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Rationale: Alterations in neurotransmitters levels is the main culprit of the epilepsy. With the antioxidant effects, taurine cause the alterations in the Glutamate and GABA levels. But its mechanism of action in epilepsy is still undeciphered. Thus, there exists rationale in preventing the glutamate excitotoxicity by taurine as neuroprotective strategy in pentylenetetrazole (PTZ) induced kindling epilepsy.

Objective: Aim of present study is to investigate the neuroprotective role of taurine and its modulation by minocycline (Mino) in the kindling epilepsy.

Method: PTZ (40 mg/kg, i.p.) was administered alternatively for 29 days until animal exhibited full motor seizures. Taurine was given orally at a dose of 25, 50 and 100 mg/kg by dissolving it in distilled water once a day 1 h prior to PTZ treatment and minocycline at the dose of 50 and 100 mg/kg and its combination (Taurine 50 mg/kg + Mino50 mg/kg) and (Taurine 100 mg/kg + Mino100 mg/kg) for the period of 29 days. Various neurobehavioral parameters followed by biochemical, mitochondrial respiratory enzyme complexes (I-IV), neurotransmitter examinations (Glutamate, GABA, Serotonin, Dopamine and Norepinephrine) by HPLC and histopathological alterations by haematoxylin and eosin stain were assessed.

Results: PTZ administration significantly impaired the cognitive performance in the morris water maze (MWM) performance test, increased the seizure score, caused oxidative stress, mitochondrial dysfunctioning and also caused alterations in the neurotransmitter levels and in the histopathology of hippocampus and cortex. Treatment with the taurine (25, 50 and 100 mg/kg), minocycline (50 and 100 mg/kg) for 29 days significantly improved the seizure score, reduced AChE activity, oxidative damage (reduced LPO, nitrite level and elevate the SOD, catalase and GSH levels) and also restored the mitochondrial complexes (Complex I, II and IV) and improved the neurotransmitter levels (Glutamate, GABA, Serotonin, Dopamine and Norepinephrine). Combination of taurine with minocycline showed more significant effects as compared to the per se effect. Further, histopathological alterations showed the significant improvement effects in the combination of taurine with minocycline.

Conclusion: Taurine when combined with minocycline show the neuroprotection by decreasing the glutamate excitotoxicity against the PTZ induced kindling epilepsy.

Speaker Biography

Manveen Bhardwaj is a PhD Research Scholar at Panjab University, Chandigarh, India. She did her M. Pharmacy I.S.F college of Pharmacy, Moga in the year 2013. She has been awarded with "Young Scientist Award" at Punjab science congress at SUS college of Tangori Mohali.

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