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Melatonin Prevents Dexamethasone-Induced Involution of the Thymus and Spleen in Mice

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Abstract: *Synthetic glucocorticoids like dexamethasone (DEX) are potent anti-inflammatory agents, but their prolonged use induces severe immunosuppression and characterized by profound lymphoid organ involution. Melatonin (MEL), an endogenous indolamine synthesized by the pineal gland, possesses well-documented immunomodulatory, antioxidant, and anti-apoptotic properties. Based on the above, it is hypothesised that Melatonin cotreatment may antagonize the immunosuppressive effects log-term Dexamethasone treatment and hence the present study was designed to investigates the potential of melatonin to antagonize Dexamethasone-induced involution of the thymus and spleen in a murine model. Thirty young adult male Parkes strain mice were divided into three groups: Control (vehicle), DEX-treated (400 µg/kg/day, i.p.), and DEX+MEL-treated (DEX 400 µg/kg/day, i.p. + MEL 750 µg/kg/day, s.c.). Treatments were administered daily between 16:30 and 17:30 for 30 consecutive days. Following the experimental period, lymphoid organs were dissected out, weighed, and histological changes were assessed via Haematoxylin and Eosin (H&E) staining. Log-term Dexamethasone administration induced a significant reduction in both thymic and splenic absolute weights. Co-administration of melatonin significantly restored the organ weights which were comparable to Control (vehicle) group. Histological analysis of DEX-treated mice revealed severe cortical thymocyte depletion and white pulp hypoplasia in the spleen. Co-administration of melatonin significantly preserved the microanatomical architecture of both the thymus and spleen. Histomorphology of lymphoid organs in DEX+MEL-treated group were comparable to Control (vehicle) group. In the present study, Melatonin effectively antagonized Dexamethasone-induced effects on lymphoid organs in young adult male albino mice (Parkes Strain), suggesting its therapeutic potential as a cytoprotective adjuvant during chronic corticosteroid therapy..*

Keywords: Melatonin, Glucocorticoids, Dexamethasone, Corticosteroid, Neuroimmunomodulation, Thymus, Spleen, Thymocytes, Involution, White pulp, Red pulp, Follicles, Mice