Monosodium Glutamate-induced Testicular Toxicity and Possible Therapeutic Role of Stem Cells *versus* Zinc Oxide Nanoparticles in Adult Albino Rat: Histological, Immunohistochemical and Biochemical Study

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Summary

Consumption a balanced, nutrient-rich diet is essential to living a happy, safe life. Food additives are compounds that are used in the food business to preserve food's quality, consistency, taste, alkalinity, or acidity in order to make it palatable, enjoyable, and visually appealing. MSG is a naturally occurring ingredient in a variety of foods high in protein, including meat, cheese, and some vegetables. Consuming MSG has been associated with a number of structural and functional abnormalities, including neurotoxic, hepatotoxic, and reproductive-endocrine dysfunction.

The current study was done to examine the histopathological, immunohistochemical and biochemical alterations in adult albino rats' testicular toxicity caused by monosodium glutamate and also compare the effectiveness of zinc oxide nanoparticles and stem cells in treating testicular toxicity caused by monosodium glutamate.

MSCs are characterised as undifferentiated, unspecialized cells that can divide repeatedly to renew themselves over extended periods of time. They can also proliferate, alter, and develop into other cell types with distinct roles. MSCs are a type of cell that can be found in the bone marrow, liver, lung, adipose tissue, amniotic fluid, umbilical cord, peripheral blood, umbilical blood, and reproductive tissues, among other sites in the body.

ZnONPs are known to maintain reproductive tissue and be strong antioxidants. Their extensive range of uses, including medication delivery, chemical, bio, and gas sensors, cosmetics, optical, and electrical devices, and solar cells, makes them particularly significant. ZnONPs are particularly helpful in autoimmune and inflammatory illnesses as well as in medication synthesis; several mechanisms for their inhibition of inflammation have been reported.

The study involved fifty adult male albino rats from Cairo University's Faculty of Medicine. The rats were divided into five groups. Group I (Normal control) included 5 rats and group II (Sham control) included 15 rats. Group III (MSG-treated) included10 rats were received daily IP injection of MSG 4 ml/Kg body weight for two weeks. Group IV (MSG + Stem cell treated) included10 rats which MSG was injected IP at a dose of 4ml/Kg for 14 days ,then at the 15th day, rats were further injected once with BMSCs into tail vein. Group V (MSG + ZnONPs treated) included10 rats which MSG was injected IP at a dose of 4ml/Kg for 14 days ,then at the 15th day, 5mg/kg ZnONPs were given orally once daily for 28 days.

MSG treated groups showed fluid exudates, congested blood vessels, vacuolated Sertoli cells, and broad interstitial spaces between certain tubules, as revealed by their loss, radial fragmentation and deteriorated spermatogenic cells with lost basement membrane were visible.Sperm and spermatogenic cells were also lost. As comparing stem cells with ZNONPs for their therapeutic role, both of them gave good results, but stem cells gave better results than ZNONPs in restoration of seminiferous tubules to normal case and return of biological parameters to values near normal.