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News & Comments

Lycopene Reduces the In Vitro Aging Phenotypes of Mouse

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Ovulation is the process by which the oocytes are released into the oviduct from the ruptured mature ovarian follicle. Several layers of cumulus cells, together referred to as cumulus-oocyte complexes, typically surround oocytes as they ovulate. It is well recognized that postovulatory aging causes a significant decline in oocyte quality, which in turn lowers the success rates of fertilization in many assisted reproductive technologies. It has been observed that lipid peroxidation rises in old mouse oocytes. Malondialdehyde (MDA), a by-product of polyunsaturated fatty acid peroxidation, is frequently brought on by high ROS concentrations. Tomatoes and other fruits and vegetables have high quantities of lycopene, a red carotenoid pigment.

The current work was carried out at the Faculty of Veterinary Medicine, Reproductive Biology Research Laboratory (RBRL), Department of Theriogenology, Mansoura University, Egypt. The Medical Experimental Research Centre was home to the BALB/c albino laboratory-bred strain of mice used in this investigation. Mice were put to death by cervical dislocation, and after the abdominal cavity was cut open, the ovaries were extracted. The previous procedures were continued, and oocytes from the three groups were collected, lysed, and the concentrations of H2O2, MDA TAC, GSH, CAT, and SOD were measured and compared between different groups to gain additional insights about the impact of lycopene supplementation of IVM medium on the levels of oxidative biomarkers in the in vitro-aged mouse oocytes.

Mammalian oocyte post-ovulatory aging reduces the rates of oocyte survival, sperm penetration during fertilization, and embryo development, all of which have a negative impact on developmental competence. By adding lycopene to the IVM medium in our work, we were able to lessen the severity of the aberrant phenotypes connected to oocyte aging. Postovulatory aging alterations are mainly attributable to increasing ROS production levels, apoptosis, and oocyte fragmentation. Therefore, supplementing oocytes with exogenous antioxidants post-ovulation or after IVM (before fertilization) may be a useful strategy to lessen the harm that ROS causes to oocytes as they age. Oocyte postovulatory aging starts a variety of developmental processes such fragmentation, programmed cell death, and aberrant growth. There is still much to learn about why oocytes fragment as they age. However, mounting evidence points to changes in the protein expression levels of ovarian pro- and anti-apoptotic proteins as the cause of the fragmentation of aged mouse oocytes. Bcl2 and Bax, two members of the Bcl-2 gene family, have been linked to this process by activating effector caspases, which in turn cause cell death.

By reducing the oxidative damage that causes aging and apoptosis, the study has shown that lycopene, an antioxidant, efficiently preserved the morphology and reduced oxidative stress during in vitro aging of mouse oocytes. The postovulatory aging of mammalian oocytes treated for clinically assisted reproductive technology is currently controlled by lycopene, a natural supplement.

Source: Veterinary Sciences

KEYWORDS

lycopene, mouse oocytes, oocyte fragmentation, oxidative stress, postovulatory aging