

**Protective effect of Chitosan nanoparticles against the inhibitory effect of linoleic acid supplementation on maturation and developmental competence of bovine oocytes**

**B.R. Abdel-Halim**

*Department of Theriogenology, Faculty of Veterinary Medicine, Beni-Suef University, Beni-Suef, 62511, Egypt*

**Abstract**

The current study was conducted to investigate the effect of linoleic acid-treated oocytes during in vitro maturation (IVM) on cumulus cell expansion, oocyte nuclear maturation, blastocyst development and DNA damage of cumulus cells and how its effects were alleviated by supplementation of the maturation medium with Chitosan nanoparticles (CSNPs). Inhibitory effects of LA at a concentration (100  $\mu\text{M}/\text{ml}$ ) or more significantly decreased the percentage of oocytes reaching metaphase II stage, the rate of fully expanded cumulus cells 24 h after IVM and the percentage of blastocyst rate compared with the control ( $p < 0.05$ ). These inhibitory effects were associated with an increased in DNA damage of cumulus cells compared with controls. However, 10  $\mu\text{g}/\text{mL}$  CSNPs completely alleviated the inhibitory effects of LA on nuclear maturation of oocytes, cumulus cell expansion, and blastocyst rate but failed to do so for cleavage

rate. The current study concluded that low concentration of LA used for maturation had no inhibitory effect on developmental competence of bovine oocytes compared to the high concentration of LA. Moreover, CSNPs with 10  $\mu\text{g}/\text{mL}$  concentration may provide protection to most of the detrimental

effects of LA during IVM. Furthermore, supplementation of in vitro maturation media with a higher concentration of CSNPs was of no significance.