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In vitro Effects of Berberine on the Vitality and Oxidative Profile of Bovine Spermatozoa

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Abstract : The aim of this study was to evaluate the dose- and time-dependent *in vitro* effects of berberine (BER), a natural alkaloid with numerous biological properties on bovine spermatozoa during three time periods (0 h, 2 h, 24 h). Bovine semen samples were diluted and cultivated in physiological saline solution containing 0.5% DMSO together with 200, 100, 50, 10, 5, and 1 µmol/L BER. Spermatozoa motility was assessed using the computer assisted semen analyzer. The viability of spermatozoa was assessed by the metabolic (MTT) assay, production of superoxide radicals was quantified using the nitroblue tetrazolium (NBT) test, and chemiluminescence was used to evaluate the generation of reactive oxygen species (ROS). Cell lysates were prepared and the extent of lipid peroxidation (LPO) was evaluated using the TBARS assay. The results of the movement activity showed a significant increase in the motility during long term cultivation in case of concentrations ranging between 1 and 10 µmol/L BER ($P < 0.01$; $P < 0.001$; 24 h). At the same time, supplementation of 1, 5 and 10 µmol/L BER led to a significant preservation of the cell viability ($P < 0.001$; 24 h). BER addition at a range of 1-50 µmol/L also provided a significantly higher protection against superoxide ($P < 0.05$) and ROS ($P < 0.001$; $P < 0.01$) overgeneration as well as LPO ($P < 0.01$; $P<0.05$) after a 24 h cultivation. We may suggest that supplementation of BER to bovine spermatozoa, particularly at concentrations ranging between 1 and 50 µmol/L, may offer protection to the motility, viability and oxidative status of the spermatozoa, particularly notable at 24 h.

Keywords : berberine, bulls, motility, oxidative profile, spermatozoa, viability
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