

Cytotoxic Effects of Malathion in Granulosa Cells of Goat (*Capra hircus*) Ovary *In Vitro*

Jitender Kumar Bhardwaj¹, Priyanka Saraf²

*Reproductive Physiology Laboratory, Department of Zoology,
Kurukshetra University, Kurukshetra 136119*

ABSTRACT

Pesticides, especially organophosphates, known to boost the agriculture sector, lead to unconscious invasion in the biological system of all organisms making it detrimental. Malathion or 2-(dimethoxyphosphinothioylthio) butanedioic acid is a known chemical compound used as a potent insecticide against various insects. The present study comprehends malathion as antifertility agent causing follicular atresia or loss of follicular pool via a programmed cell death phenomenon, largely explained as Granulosa Cell Apoptosis. Thus, focusing on the effect of malathion on granulosa cell at cytological and biochemical level, the present study aims at determining *in vitro* effects of nanomolar (100nM) concentration of malathion on granulosa cells using ultrastructural analysis, flow cytometric analysis and TBARS assay. Transmission electron microscopy revealed malathion administration resulted in presence of increased indented nuclear membrane, pyknotic crescent shaped nuclei, increased vacuolization and presence of degenerating mitochondria and large osmophilic lipid droplets in granulosa cells. The flow cytometry results indicated a time dependent increase in percentage of granulosa cell apoptosis i.e. 61.2, 68, 79.4 after 4hr, 6hr and 8hr treatment respectively in comparison with control (35.9%) suggesting its role as inducer of granulosa cell apoptosis. Malathion also resulted in increased oxidative stress, increasing the level of MDA (nmols per gm wet tissue weight) at 100nM dosage of malathion i.e. 7.57 ± 0.033 , 8.53 ± 0.12 and 12.87 ± 0.78 at 4hr, 6hr and 8hr respectively as compared with control (6.07 ± 0.033 , $p < 0.005$) showing a positive correlation between malathion induced cytotoxic effect and apoptosis in granulosa cells ($r = 1$; $p < 0.01$). Thus, the parallel use of these three techniques enabled us in determining the role of malathion in inducing cytotoxicity in granulosa cells of caprine ovary, affecting fertility and survival of the population.