

## Abstract

Polycystic ovary syndrome (PCOS) is an endocrine metabolic disorder with 4-20% expected global prevalence which cause infertility at reproductive age. The objective of this study was to determine the hormonal, biochemical and histological changes in PCOS induced mice after treating with *Moringa oleifera* (MO) leaves extract, zinc oxide (ZnO) and chitosan nanoparticles (CHNPs). *Moringa oleifera* leaves extract was prepared in Soxhlet apparatus by methanolic extraction method. Extract loaded (ZnO NPs) were prepared by ZnNO<sub>3</sub> using green synthesis method and chitosan nanoparticles (CHNPs) loaded plant extract were synthesized using tripolyphosphate (TPP) as cross linking agent in Ionotropic gelation method. The plant extract, Zinc loaded nanoparticles and chitosan loaded nanoparticles were characterized by PSA, UV-visible spectroscopy and FTIR. The present study was conducted on PCOS induced female albino mice. A single dose of 2mg/kg *Estradiol valerate* (EV) in 0.2ml olive oil was administered intraperitoneally to mice for PCOS. The induction was confirmed by microscope examination of vaginal smear of mice. This experiment was done on ten groups; Negative Control (NC, Normal), Positive Control (PC-PCOS untreated), Vehicle Control (VC, PCOS induced DMSO treated), Standard Control (SC, Metformin treated), Low dose *Moringa* treated (LDM-250mg/kg), High dose *Moringa* treated (HDM-500mg/kg), ZnO *Moringa* low dose (ZNML-50mg/kg), ZnO *moringa* high dose (ZNMH-100mg/kg), CH-*Moringa* low dose (CHML-50mg/kg) and CH-*Moringa* high dose (CHMH-100mg/kg). The mice groups were administered orally with respective doses for consecutive 21 days and then euthanized for blood serum and ovaries collection. The Hormonal assay including FSH and LH, biochemical assay of liver function test (LFT-Bilirubin and ALP), renal function test (RFT-Urea and Creatinine) and histological studies of ovaries were performed for determination of protective role of different treatments. The RFT results showed the manageable range of urea and creatinine. The hormonal ratio was in 1:3 with LH and FSH when treated with CHNPs. In treatment with CHSL dose cyst were disappeared and regaining of corpus luteum was observed, while in case of CHSH defined follicles, zona pellucida and clear oocyte was observed. The most significant difference was detected in chitosan loaded nanoparticles with high dose. Collectively, current experimental data furnishes the protective role of *M. oleifera*, ZnO and CHNPs against PCOS induced mice through enhanced absorption of bioactive components in managing metabolic and hormonal imbalance by quercetin in plant extract.