

Abstract

Polycystic ovary syndrome (PCOS) is a complex metabolic disorder with 5-20% estimated global prevalence. The objective of this study was to determine the hormonal, biochemical and histological changes in PCOS induced mice after treating with *Ocimum. sanctum* (OS) leaves extract, zinc oxide (ZnO) and chitosan nanoparticles (CHNPs). OS leaves extract was prepared in Soxhlet apparatus by methanolic extraction method. Extract loaded ZnONPs were prepared by ZnNO₃ using Green synthesis method. CHNPs of plant extract were synthesized using sodium tripolyphosphate as cross-linking agent in Ionotropic gelation method. The characterization of NPs was done by Particle size analyzer, UV- visible spectroscopy and FTIR. A single dose of 2mg/kg *Estradiol valerate* (EV) in 0.2ml olive oil was administered intraperitoneally to mice for PCOS induction. The induction was confirmed by microscopic examination of vaginal smear of mice with prolonged cornification of cells and cystic development. This experiment was conducted 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 Sanctum (LDS-250mg/kg), High Dose Sanctum (HDS-500mg/kg), ZnO Sanctum Low dose (ZNSL-50mg/kg), ZnO Sanctum High dose (ZNSH-100mg/kg), CH-Sanctum Low dose (CHSL-50mg/kg) and CH-Sanctum High dose (CHSH-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 gonadotropin releasing hormonal including FSH and LH, Biochemical assay of Liver Function Test (LFT), Renal Function Test (RFT) and histological studies of ovaries were performed for determination of protective role of different treatments. The LFT showed the significant reduction in bilirubin and ALP level after treatment with CHSH when compared with PC. 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 were observed. Collectively, current experimental data furnishes the protective role of *O. sanctum*, ZnO and CHNPs against PCOS induced mice through enhanced absorption of bioactive components in managing metabolic and hormonal balance by eugenol and quercetin in plant extract.