

## ABSTRACT

Infertility is a growing global health concern, with male factors contributing to nearly 50% of reported cases. Environmental toxicants such as lead are known to impair male reproductive function primarily through oxidative stress. Pumpkin (*Cucurbita pepo* L.) seeds, often discarded as biowaste, are rich in bioactive compounds and possess potential antioxidant properties. However, their role in stress-induced male infertility remains inadequately explored. The present study investigated the ameliorative effects of *C. pepo* seed aqueous extract against lead acetate induced reproductive toxicity in male Wistar rats. The study was conducted in five phases involving nutritional and antinutritional profiling, phytochemical and chromatographic analyses, in vitro antioxidant assays, acute oral toxicity evaluation, and an in vivo experimental study. Thirty rats were divided into five groups: control, lead acetate (30 mg/kg bw), seed extract alone (1000 mg/kg bw), lead acetate with low-dose extract (100 mg/kg bw), and lead acetate with high-dose extract (1000 mg/kg bw). Oral administration was carried out intermittently (15<sup>th</sup>, 30<sup>th</sup> and 45<sup>th</sup> days) for a duration of 45 days. The parameters such as body weight and individual organ weight measurements, sperm parameters, hormonal assays, serum and testis antioxidant assays, and histopathology analysis of reproductive organs were carried out using established methodologies. Lead acetate exposure resulted in significant reductions in body and individual organ weights, sperm count, motility, viability, reproductive hormone levels (FSH, LH and testosterone) and antioxidant enzyme levels (SOD, GPx, catalase) along with increased sperm abnormalities, semen pH, lipid peroxidation (MDA), and histopathological alterations in reproductive organ tissues. Co-administration of *C. pepo* seed extract, particularly at the higher dose, significantly ameliorated these alterations in a dose-dependent manner. The key finding of this research was that the *C. pepo* seed extract treatment has mitigated lead induced toxicity and exhibited significant improvement in their reproductive potential owing to the antioxidant property of their phytochemical components.

**Keywords:** *Male Infertility, Oxidative Stress, Lead Acetate, Cucurbita pepo* L. *Seeds, Antioxidant Potential*