

Title: Green Synthesis of Iron Oxide NPs (IONPs) by Using Aqueous Extract of Parthenium hysterophorus Linnaeus for the In-vitro Antidiabetic and Anti-inflammatory Activities

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Abstract: The Parthenium hysterophorus Linnaeus is one of the anti-inflammatory and antidiabetic ethnomedicine. Therefore the formulation of this plant as nanoparticles will be fruitful anti-inflammatory and antidiabetic as compared to conventional extract. In the current study, the aqueous kernel extract from Parthenium hysterophorus Linnaeus was subjected to synthesize iron oxide nanoparticles (IONPs) and explored their anti-inflammatory and anti-diabetic potentials. The results indicate that the aqueous kernel extract effectively produced IONPs, which were verified using standard analytical methods. UV-visible spectrophotometer analysis was used to check the formation of IONPs. The Fourier-transform infrared spectroscopy (FTIR) was used to check numerous functional groups from the valuable phytochemicals present in the extract. These functional groups play crucial roles as reducing, capping, and stabilizing agents during the synthesis of IONPs. Additionally, scanning electron microscopy (SEM) were utilized to investigate the surface characteristics of the nanoparticles. Notably, the IONPs fabricated from the extract demonstrated promising anti-inflammatory activity, inhibiting Human RBC by 79% and Heat Induced Hemolysis by 72%, as well as showing anti-diabetic potential with 60% inhibition of yeast glucose uptake and 72% inhibition of α -amylase activity, all at a concentration of 100 μ g mL⁻¹. These effects were partly comparable to standard drugs with anti-inflammatory activity of 85% inhibition of Human RBC and 78% inhibition of Heat Induced Hemolysis, and anti-diabetic activity of 67% inhibition of yeast glucose uptake and 78% inhibition of alpha amylase.

Keywords: IONPs, Green Synthesis, Parthenium hysterophorus, Antidiabetic Assays, Anti-inflammatory Assays

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