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"Characterization of a novel leaf lectin isolated from Plectranthus zeylanicus plant exhibiting antimicrobial activity"

Plectranthus zeylanicus is a medicinal and aromatic plant, with a pungent oregano-like flavor and odor, belongs to the Lamiaceae family. P. zeylanicus, a lesser-known but highly valuable species, is native to tropical and subtropical regions, particularly in South and Southeast Asia. It has been traditionally used in Ayurvedic and folk medicine for its antimicrobial, anti-inflammatory, and digestive properties. After dialysis against deionized water for 24 hours, the crude extract of the leaves was extracted using an aqueous two-phase technique (sodium chloride, ammonium sulphate, and PEG) to separate the glycoprotein. The dialyzed sample was then purified using an affinity chromatography column that was made with galactose (Himedia, India) sugar and Seralose-4B beads (SRL, India) as a matrix. Epichlorohydrin was used as a cross-linking agent. The crude extract and purified sample had protein contents of 110.42µg/ml and 183.46µg/ml, respectively, as assessed by Lowry's technique. At 64 HU, it was discovered that the purified lectin (PZL) agglutinates chicken and sheep erythrocytes. Using the hemagglutination inhibition experiment, the PZL demonstrated a high affinity for galactose. Two near bands at 75.3 kDa were found when PZL's molecular weight was determined using SDS PAGE. Subsequent analysis of the lectin activity showed that it was stable between 4 and 7 pH and between 35 and 55 degrees Celsius. The metal chelation effect on hemagglutination activity showed that the presence of the Mg2+ cation increased the lectin activity. Using the phenol-sulfuric acid estimation method, the purified sample's total carbohydrate content was found to be 4.04%. Although the purified lectin lacked carbonyl or hydroxyl functionalities, the FTIR analysis revealed that it most likely contained aromatic compounds with ether, amine, or phosphate groups that aid in binding to the carbohydrate moiety. While no inhibition was seen against Staphylococcus aureus, Klebsiella pneumoniae, or Rhizopus oryzae, the PZL inhibited the growth of Bacillus subtilis and Aspergillus fumigatus, indicating that the lectin had a binding affinity for galactan residues present in the cell walls of these two bacteria. The lectin activity can be further examined in relation to its potential in immunomodulatory applications and cancer investigations. All things considered, this is the first report of a lectin isolated and purified from the leaves of the Plectranthus zeylanicus plant.

Keywords –Lectin, Purification, Hemagglutination, Antimicrobial activity
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