

Potent anticancer, antioxidant and antibacterial activities of isolated flavonoids from *Asplenium nidus*

RiniJarial^a; SvetaThakur^a; MimiSakinah^a; A.W.Zularisam^a; AmitSharad^b; S.S.Kanwar^c; LakhveerSingh^a

^a Faculty of Engineering Technology, Universiti Malaysia Pahang (UMP), Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia

^b Department of Medicinal Chemistry, National Institute of Pharmaceutical Education and Research, NIPER-Ahmedabad, India

^c Department of Biosciences, HPU, Summer Hill, Shimla 171005, India

ABSTRACT

Bioactive flavonoids derived from *Asplenium nidus* (fern) possess potent tumoricidal, anti-bacterial, anti-oxidant activities that are responsible for their chemo-preventive potential against multidrug-resistant (MDR) pathogens, *Proteus mirabilis*, *Proteus vulgaris* and *Pseudomonas aeruginosa*. Fractionation and recognition of the flavonoids were attained through gas chromatography and mass spectrometry (GC/MS). Twelve known and three unknown compounds were revealed by fractions 1 & 3, representing 13.12% and 2.61% out of the total composition (15.12%). Gliricidin-7-O-hexoside was found 3.83% followed by quercetin-7-O-rutinoside (3.09%) keampferol-3-O-rutinoside (0.19%) and myricetin-3-O-rhamnoside (1.10%). The anti-bacterial and anti-oxidant activities of present fractions along with pure bioactive constituents were tested against three MDR pathogens through microbroth dilution: MIC₅₀ ranges for amoxicillin, gliricidin-7-O-hexoside and quercetin-7-O-rutinoside were 0.0003–0.06 µg/mL, 0.004–0.06 µg/mL and 0.005–6.0 µg/mL, respectively. Gliricidin-7-O-hexoside and quercetin-7-O-rutinoside's inhibitory activities were comparable to standard antibiotic, amoxicillin ($p > 0.05$). Herein we report for the first time a number of flavonoids that may act as the source of therapeutically useful compounds against MDR pathogens. In addition, the most extracted flavonoids (gliricidin-7-O-hexoside (78.1%) and quercetin-7-O-rutinoside (69.2%)) showed a significant *in vitro* antioxidant activity i.e. DPPH radical scavenging activity. Both fractions of *A. nidus* showed obvious cytotoxic effects on human hepatoma HepG2 and human carcinoma HeLa cells. Moreover, the anti-cancer activity generally enhanced with ameliorating antioxidant and antibacterial potential of fern's flavonoids. These findings illustrate the potential of this fern as a probable source of bioactive constituents and provide a scientific basis for its folklore or ethno-medicinal uses for infectious diseases and cancers.

KEYWORDS:

Asplenium nidus; Flavonoids; Anti-oxidant; Anti-cancer; Anti-bacterial