Research Paper Chemistry

Bioactive Polyphenol of Nelumbo Nucifera

* B. Anandhi **D. Sukumar

*,** P.G and Research Department of Chemistry, Government Arts College (Autonomous), Kumbakonam, Tamil Nadu

ABSTRACT

Nelumbo nucifera Gaertn., syn. Nelumbium nelumbo Druce., syn Nelumbium speciosum Wild., popularly known as lotus in English, and ambal and thamarai in Tamil belongs to Nymphaeceae . The white corolla of the fresh flowers of N. nucifera have been investigated for the flavonoids .The structure was confirmed by modern physical methods like 1H-NMR, 13C-NMR, UV, PC, chemical reactions and hydrolytic studies. The corolla is found to contain quercetin and miquelianin. An in vitro study has been carried out to investigate the HRBC membrane stabilization of the isolated drug. It was inferred that glycoside is unable to stabilize the membrane.

Keywords : Nelumbo nucifera, quercetin , miquelianin , HRBC membrane stabilization

Introduction:

Corolla of fresh flowers of Nelumbium Speciosum Wild [1], syn. Nelumbo nucifera [2] Gaertner collected from the ponds in and around Kumbakonam of Thanjavur District of Tamil Nadu during January was extracted with 85% methanol (5 x 500 ml). The combined alcoholic extract was concentrated in vacuo and the aqueous concentrate was successively fractionated with benzene (3 x 250 ml) peroxide – free Et_2O (4 x 250 ml) and EtOAc(4 x 500 ml) and each of these fractions was separately studied. The benzene fraction did not yield any isolable solid and could not be studied further.

Experimental:

Et_2O fraction gave quercetin and the EtoAc fraction yielded miquelianin. The structures were confirmed by modern physical methods like ^{1}H NMR, ^{13} C NMR,UV,PC ,chemical reactions and hydrolytic studies .The hypotonicity induced haemolysis have been observed by the in vitro study of HRBC membrane stabilization.

RESULTS and DISCUSSION

The fresh flowers of Nelumbo nucifera (corolla) are found to contain quercetin and miquelianin. The UV spectra of the aglycone and glycoside proved the structures. In the ^{1}H-NMR spectrum (400 MHz, DMSO-d_6, and TMS) of the aglycone, the 5 -OH proton appears as a distinct singlet at 12.485 ppm. The C-8 proton is represented by singlet at 6.617 ppm .The C-6 proton appear at 6.175 ppm .The hydroxyl protons at C-7,C-3'and C-4' resonate at 10.772, 9.302 and 9.217 ppm respectively [3] . The signal located at 7.665 ppm represents the overlapping protons at C-2' and C-6'.The proton at C-5'appears at 6.869 ppm (d, J=8.5 Hz). Supporting evidence of the structure of the quercetin is provided by the ^{13} C-NMR (100 MHz, DMSO-d_6, and TMS), spectral data. Based on these observations, the aglycone has been unambiguously characterized as quercetin.

In the ^{1}H-NMR spectrum of the glycoside (400 MHz,DMSO-d_6, TMS) the signal at 7.477 ppm (d, J=7.8 Hz) corresponds to the protons at C-2' and C-6'.The proton at C-5' appears at 6.740 ppm (d, J=2.7 Hz) whereas those of C-6 and C-8 resonate respectively at 6.586 ppm (d,J=3.5 Hz) H-1" of the glucuronic acid resonates at 5.177 ppm (d, J=3.6 Hz). The rest of the sugar protons appear in the range of 3.323 ppm.

Supporting evidence for the structure of the flavonol glycoside is provided by the 13C-NMR (100 MHz, DMSO-d6, and TMS) spectral data. .The 13 C-NMR spectral data for the corresponding aglycone as culled out from the literature are also listed for easy comparison.

On this basis the aglycone and glycoside isolated from Nelumbo nucifera has been identified as quercetin and miquelianin.

The HRBC membrane stabilization studies of the glycosides have been extensively studied in literature. In general the trend observed in the pigments used to biphasic in nature. But in the existing isolated glycoside, the membrane is destabilized even from the initial injection of the drug. After reaching a concentration of 25 g the curve becomes parallel to the concentration axis so that a mild stabilization is observed in the drug. Beyond the concentration of 50 g total declination alone is observed. From the trend observed in the fore-going experiment it is observed that the drug miquelianin only destabilize the membrane. Thus the in vitro study has shown that the glucuronide is observed to have hypotonicity induced haemolysis alone.

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