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Novel Phenolic Biopolyether with Potential Therapeutic Effect

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Abstract : The high-molecular fractions from the several species of two genera (Symphytum and Anchusa) of Boraginaceae family Symphytum asperum, S. caucasicum, S. officinale, and Anchusa italica were isolated. According to IR, 13C and 1H NMR, 2D heteronuclear 1H/13C HSQC spectral data and 1D NOE experiment, the main structural element of these preparations was found to be a regularly substituted polyoxyethylene, namely poly[3-(3,4-dihydroxyenyl)glyceric acid] (PDPGA) or poly[oxy--carboxy-2-(3,4-dihydroxyphenyl)ethylene]. Such caffeic acid-derived biopolymer to our knowledge has not been known and has been identified for the first time. This compound represents a new class of natural polyethers with a residue of 3-(3,--dihydroxyphenyl)glyceric acid as the repeating unit. Most of the carboxylic groups of PDPGA from A. italica unlike the polymer of S. asperum, S. caucasicum, and S. officinale are methylated. The 2D DOSY experiment gave the similar diffusion coefficient for the methylated and non-methylated signals of A. italica PDPGA. Both sets of signals fell in the same horizontal. This would imply a similar molecular weight for methylated and non-methylated polymers. This was further evidenced by graphic representations of the intensity decay of the 1H signals of aromatic H-2″ and H-1 at δ 7.16 and 5.24 and that of the methoxy group at δ 3.85. These three signals essentially showed the same curve shape. According to results of in vitro and in vivo experiments PDPGA of S.asperum and S.caucasicum could be considered as potential anti-inflammatory, wound healing and anti-cancer therapeutic agent.

Keywords : caffeic acid-derived polyether, poly[3-(3,4-dihydroxyphenyl)glyceric acid], poly[oxy-1-carboxy-2--3,4-dihydroxyphenyl)ethylene], symphytum, anchusa
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