

Chemical Modifications of Carotol and Their Antioxidant Activity

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Abstract : The carrot seed essential oil was obtained by hydrodistillation. Hexane, dichloromethane, and methanol solvents were used for extraction of carrot seed by Soxhlet extraction methods. The major and minor compounds identified in carrot seed essential oil were carotol (52.73), daucol (5.10), daucene (5.68), (E)- β -farnesene (5.40), β -cubebene (3.19), longifolenaldehyde (3.23), β -elimene (3.23), (E)-caryophyllene (1.22), β -bisabolene (2.95) etc. The chemical composition of hexane, dichloromethane, and methanol extracts was different. Carotol was the common compound present. Major compounds isolated were from the carrot seed essential oil by column chromatography. Chemical transformations of carotol (2) with mercuric acetate/sodium borohydride, dry hydrochloric acid gas, acetonitrile/sulfuric acid, selenium dioxide/t-butyl hydrogen peroxide, N-bromosuccinimide, hydrogen iodide, and phenol were carried out. The derivatives of carotol were designed to explore the significance of some structural modifications in relation to antioxidant activities. The structures of major compounds and derivatives were confirmed on the basis of FT-IR, ¹HNMR and ¹³CNMR spectroscopy. Antioxidant activity of carrot seed essential oil, various extracts and isolated compounds were tested by in vitro models involving 2, 2-diphenyl-1-picrylhydrazyl (DPPH•), hydroxyl (OH•), nitric oxide (NO•), superoxide radical scavenging methods and ferric reducing antioxidant power assay (FRAP). Chemical transformations of major isolated compound carotol were carried out, and antioxidant activity of all compounds was undertaken. The major sesquiterpenoid carotol isolated from carrot seed essential oil showed the highest antioxidant activity in all the methods. The methanol extract showed higher antioxidant potential as compared to carrot seed essential oil, hexane, and dichloromethane extracts.

Keywords : antioxidant, carotol, carrot, DPPH

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