

Antibacterial and Antioxidant Properties of Total Phenolics from Waste Orange Peels

Authors : Kanika Kalra, Harmeet Kaur, Dinesh Goyal

Abstract : Total phenolics were extracted from waste orange peels by solvent extraction and alkali hydrolysis method. The most efficient solvents for extracting phenolic compounds from waste biomass were methanol (60%) > dimethyl sulfoxide > ethanol (60%) > distilled water. The extraction yields were significantly impacted by solvents (ethanol, methanol, and dimethyl sulfoxide) due to varying polarity and concentrations. Extraction of phenolics using 60% methanol yielded the highest phenolics (in terms of gallic acid equivalent (GAE) per gram of biomass) in orange peels. Alkali hydrolyzed extract from orange peels contained 7.58 ± 0.33 mg GAE g^{-1} . By using the solvent extraction technique, it was observed that 60% methanol is comparatively the best-suited solvent for extracting polyphenolic compounds and gave the maximum yield of 4.68 ± 0.47 mg GAE g^{-1} in orange peel extracts. DPPH radical scavenging activity and reducing the power of orange peel extract were checked, where 60% methanolic extract showed the highest antioxidant activity, $85.50 \pm 0.009\%$ for DPPH, and dimethyl sulfoxide (DMSO) extract gave the highest yield of $1.75 \pm 0.01\%$ for reducing power ability of the orange peels extract. Characterization of the polyphenolic compounds was done by using Fourier transformation infrared (FTIR) spectroscopy. Solvent and alkali hydrolysed extracts were evaluated for antibacterial activity using the agar well diffusion method against Gram-positive *Bacillus subtilis* MTCC441 and Gram-negative *Escherichia coli* MTCC729. Methanolic extract at 300 μ l concentration showed an inhibition zone of around 16.33 ± 0.47 mm against *Bacillus subtilis*, whereas, for *Escherichia coli*, it was comparatively less. Broth-based turbidimetric assay revealed the antibacterial effect of different volumes of orange peel extracts against both organisms.

Keywords : orange peels, total phenolic content, antioxidant, antibacterial

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