

nm, indicating the necessity for further verification. UHPLC analysis using isocratic and gradient techniques indicated peaks for AS at 2.950 and 2.949 mins, respectively, but corresponding peaks were not detected in the pasteurized or raw milk samples. Our study confirmed that amoxicillin residues were either absent or below the detectable level in the pasteurized milk samples analyzed. As a result, the pasteurized milk samples were confirmed to be free of amoxicillin

residues, ensuring compliance with safety regulations in Sri Lanka.

Keywords:

Antibiotic; Amoxicillin; Milk; HPLC; TLC.

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Antioxidant and photoprotective properties of *Flacourtia indica* fruit extract: fractionation, and application in lipstick formulation

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Flacourtia indica, known as Ugurassa in Sri Lanka, is widely recognized for its ethnomedicinal applications. Despite its traditional use, scientific studies on its antioxidant and photoprotective properties remain limited. This study aimed to evaluate the antioxidant and photoprotective properties of *F. indica* fruit extract, perform sequential fractionation to identify bioactive fractions and incorporate a suitable bioactive fraction into a lipstick formulation to develop a herbal multifunctional lipstick. Chemical constituents in dried fruit powder were extracted by maceration using hexane, acetone, ethanol:water (80%v/v), and methanol. The highest extraction efficiency (12.13%) was obtained with ethanol:water (80%v/v). The total phenolic content (TPC) and total flavonoid content (TFC) in ethanol: water (80%v/v) extract were determined using Folin-Ciocalteu and aluminum chloride assays, respectively, yielding 21.10 ± 0.01 mg GAE/g and 34.70 ± 2.20 mg CE/g. Antioxidant potential was assessed using 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging ($IC_{50} = 782.94 \pm 12.61$ µg/mL) and ferric reducing antioxidant power (FRAP) (0.348 ± 0.008 mg BHT/g) assays. The photoprotective property

was evaluated by determining the sun protection factor (SPF) spectrophotometrically with the Mansur equation, which indicated moderate UV protection (17.19 ± 1.63). Sequential fractionation of the extract was performed using hexane, chloroform, ethyl acetate, and methanol. SPF evaluation showed notable values for the hexane (30.85 ± 2.84), chloroform (17.19 ± 1.63), and methanol (15.99 ± 0.65) fractions. The methanol fraction exhibited the highest antioxidant activity (DPPH, $IC_{50} = 296.50 \pm 2.27$ µg/mL). As the methanolic fraction was red and exhibited antioxidant and photoprotective properties, it was incorporated into a lipstick formulation. The developed lipstick formulation was evaluated for color (dark red), texture (smooth), pH (5.6), melting point (53 °C), and skin compatibility (no skin irritation), confirming its suitability according to the Bureau of Indian Standards 9875:2018 guidelines for application, contingent upon the completion of toxicity studies.

Keywords:

Flacourtia indica; Antioxidant; photoprotective properties; lipstick.