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Chemical and microbiological contaminants and preservatives in commercially available tomato sauces

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Tomato sauces are a part of the processed food industry which is currently amongst the fastest growing both for consumption and export making it a highly profitable industry. The present work was aimed to determine microbiological and some chemical parameters of commercially available tomato sauces.

The study was conducted with four (4) different brands of sauces and was compared with the limits stated in the Sri Lanka Standard 260 : 2008 (UDC 664.871.6 : 635.64). All tests were conducted according to the International Organization for Standardization (ISO) and Association of Official Analytical Chemists methods (AOAC). The parameters that were ascertained are benzoic acid and sulfur dioxide content used as preservatives, *E. coli*, the Howard Mold Count, and a trace metal analysis conducted for cadmium.

In this study three different batches from each brand was tested microbiologically and for heavy metals (one sample from each batch) whereas three different batches from each brand was analyzed in triplicate for preservatives (three samples from each batch).

The study showed the presence of sulphur dioxide in all four brands (2-52 mg/kg) which was less than the limit (100 mg/kg). Benzoic acid was also found in all four brands (40-357 mg/kg) with high variations which may be due to manufacturing inconsistencies and two brands from one batch exceeded the limit (250 mg/kg). In case where the samples exceeded the quoted limit a percentage of the total preservatives (sulphur dioxide and benzoic acid) was required to be calculated which should not exceed 100%. Results showed samples from one batch in one brand exceeded 100% whereas the other did not. The Howard mold count, *E. coli* and cadmium were absent in all four brands. Of the four brands tested, for three brands parameters tested conform to SLS specifications whereas for the other brand benzoic acid level from a sample from one batch did not conform to the limit specified by SLS standard. All different brands were compared with each other using the Null-Hypothesis, t-tests and f-tests for statistical analysis.

Keywords

tomato sauce, preservatives, cadmium, *E. coli*, Howard mold count

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Plumbagin functionalized silver nanoparticles for potential antimicrobial applications

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Plumbago indica L. called "Rathnitul" in Sinhala is a medicinal plant belonging to the family Plumbaginaceae that is extensively used in the traditional system of medicine in Sri Lanka. Plumbagin is a naturally occurring hydroxynaphthoquinone which is predominantly found in the roots of *Plumbago indica* L. Plumbagin has been proven to possess remarkable pharmacological properties which include antimicrobial, anticancer, anti-inflammatory, antioxidant, and antiparasitic properties. However, high volatility, poor oxidative stability, poor bioavailability, less target specificity and high toxicity of plumbagin have limited its use in therapeutic applications. In recent years, enormous attention has been drawn towards the functionalization of natural

products. Thus, the functionalization of plumbagin with an appropriate nanomaterial is a promising strategy to overcome the problems associated with plumbagin when used alone, and to enhance the therapeutic potential of plumbagin in its use for therapeutic applications. Silver nanoparticles (AgNPs) have garnered significant interest of the scientific community for synthesis of "hybrid drug molecules" as they act as good nanocarriers of the drugs leading to targeted drug delivery. Furthermore, the unique physical, chemical, optical and biological properties of AgNPs have made them excellent candidates in biomedical applications as antimicrobial and anticancer agents.

Here, we report a preliminary study conducted to synthesize plumbagin functionalized AgNPs to be used in antimicrobial applications. In this study plumbagin was extracted from the roots of *Plumbago indica* and crude plumbagin was purified by recrystallization.[1] The identity and purity of plumbagin were confirmed by GC/MS, FT-IR and UV-Vis spectra. AgNPs were synthesized by reduction of silver nitrate with hydroxylamine hydrochloride following the Leopold-Lendl method.[2] Synthesized AgNPs gave rise to the characteristic surface plasmon resonance (SPR) absorption peak at 410 nm in the UV-Vis spectrum. Vortex mixing of AgNPs with plumbagin in 1: 2×105 molar ratio at 1600 rpm for 2 hours at room temperature led to the successful functionalization of AgNPs with plumbagin, resulting a significant difference in the UV-Vis and FT-IR spectra. Since both materials possess notable antimicrobial properties, an enhanced antimicrobial potential is expected from plumbagin functionalized AgNPs due to the synergistic effect. Investigation of the antimicrobial potential of plumbagin functionalized AgNPs is currently in progress.

Keywords

Plumbagin, Silver nanoparticles, Functionalization, Antimicrobial

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Technical Sessions : A - 24

Cytotoxic potential and apoptotic effect of Barringtonia asiatica seed kernel against HepG2 cell line

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Liver cancer causes significant morbidity and mortality among humans worldwide due to lack of effective therapeutic strategies for control and treatment. According to World Health Organization, 7.5 % of male deaths in Sri Lanka are due to liver cancer and mortality rate due to liver cancer is increasing each year[1]. The need for pharmacological agents has necessitated the search for newer therapies from natural products. *Barringtonia asiatica* is a species of *Barringtonia* native to mangrove habitats along tropical coasts and islands of the Indian Ocean and is grown as an ornamental plant in Sri Lanka. Crude methanolic extract (CME ;15 g powder / 40 mL MeOH; 24 hrs; dried at 45oC)) and an isolated fraction (MPLCBA-3 fraction) of CME of B. asiatica, using medium pressure liquid chromatography (MPLC) have showed cytotoxicity against HepG2 cell line2. The present study investigated the mechanisms of cytotoxicity of CME and MPLCBA-3 fractions from *Barringtonia asiatica* seed kernel against HepG2 cell line. Cytotoxicity was assayed with LDH assay with CME (10, 25, 50, 75, 100, 125 ppm) and MPLCBA-3 fraction (2.5, 5, 10, 15, 20, 25 ppm). Mechanisms of action were determined using DNA fragmentation analysis with CME (25, 50 and 100 ppm) and MPLCBA-3 fraction (5, 10 and 20 ppm) and fluorescence microscopic analysis with CME (10, 20, 40 and 80ppm) and MPLCBA-3 (5, 10, 20, 40 ppm] against the liver cancer cell line using standard procedures3,4,5. The total LDH activities in the medium when HepG2 cells were treated with CME (10-125 ppm) and MPLCBA-3 fraction (2.5-25 ppm), increased from 53.1%-87.3% [34.2%] and 53.9– 66.4% [12.5%], respectively against the controls. LDH activity increased with increasing concentration of the cytotoxic fraction confirming cell membrane damage by CME and MPLC fractions. However, MPLCBA-3 fraction caused more damage compared to CME. AO/EB staining