

Relationship between Antioxidant and Antibacterial Properties of Flowers, Leaves and Stems of Tanner's Cassia (*Senna auriculata*) grown in Sri Lanka.

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Introduction

Medicinal plants have been widely used around the world to cure many diseases because their constituents show satisfactory efficacies. For example, the South-Asian herbal plant, Tanner's Cassia (*Senna auriculata*) in figure 1 contains many antioxidants/phytochemicals such as flavonoids and phenols which cure diabetes & conjunctivitis. While unstable free radicals



Figure 1. Tanner's Cassia Plant

abstract electrons from other stable compounds to attain stability, those compounds become free radicals and develop an oxidative stress which can cause cell death/diseases. But plant antioxidants with enough electrons can stabilize the unstable free radicals present in our body to avoid oxidative-stress while being stable. According to studies, Tanner's Cassia expresses broad-spectrum antimicrobial activity against standard-strains. This research was conducted to determine any relationship between antioxidant capacity and antibacterial properties of Tanner's Cassia extracted to a series of solvents.

Methodology

Initially, phytochemicals in powdered Tanner's Cassia plant parts such as leaves, flowers & stems from Negombo-Sri Lanka, were extracted using 3-polar-solvents; 80% ethanol, 80% methanol and distilled water. After the roller-mixer solvent-extraction by cold-maceration, to determine the antioxidant capacities of extractions, antioxidant assays such as total-flavonoid-content(TFC), total-phenolic-content(TPC), total-antioxidant-content(TAC), ferric-reducing-antioxidant-power(FRAP) assays were carried out. Additionally, chemical compounds such as ABTS(2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic-acid)) and DPPH(2,2-diphenyl-1-picrylhydrazyl) were used for radical scavenging assays.

Spectrophotometric methods were used in these tests to determine the unknown phytochemical concentrations. Antibacterial properties against standard strains; *Staphylococcus aureus* and *Escherichia coli* were measured by Minimum Inhibitory Concentration(MIC). Statistical analysis was carried out using IBM-SPSS-Statistics-21 and Microsoft-Excel softwares.

Results

It was confirmed that strong positive correlations of $r=+0.870$ (leaves), $r=+0.896$ (flowers) and $r=+0.987$ (stems) present between antioxidant capacities of TFC & TAC. Moreover, strong positive correlations of $r=+0.830$ (leaves), $r=+0.335$ (flowers) and $r=+0.984$ (stems) present between TPC & TAC of the solvent extracts indicating the abundance of flavonoids and phenols in this plant. A negative correlation of $r=-0.428$ between TAC & MIC shows an indirect proportionality.

Conclusions

Studies show that MIC is indirectly proportional to antibacterial activity. Therefore it was confirmed that antioxidant-capacity (TAC) is directly proportional to the antibacterial activity of Tanner's Cassia plant. Moreover 80%-methanol flower-extracts showed a significant impact on above correlations compared to other extracts. Further improvements such as, antimicrobial-gradient-method to test the combined effect of multiple plant extracts, can bring this research into a turning point of a new drug development against common diseases.