Unraveling the Antioxidant and Antibacterial Potential of Leaves of *Phyllanthus acidus* and *Phyllanthus emblica* in a Sri Lankan Setting

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Abstract—Phytochemicals, exhibit robust antioxidant characteristics and auspicious antibacterial effects, positioning them as resources for the advancement of natural antioxidant and antibacterial agents. The current study assessed the phytochemical composition, antibacterial and antioxidant power of leaves of Phyllanthus acidus and Phyllanthus emblica in aqueous extracts. Total Phenolic Content (TPC), Total Flavonoid Content (TFC) and the Total Antioxidant Capacity (TAC) were quantified by Folin Ciocalteu, Aluminum Chloride colorimetric and Phosphomolybdate assays respectively. Free radical scavenging power was determined utilizing 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. Escherichia coli and Staphylococcus aureus were used to test the antibacterial power by twain approaches: well diffusion and disc diffusion. TPC of P. acidus and P. emblica were 76.01±0.1 mg GAE/g and 130.8±0.1 mg GAE/g respectively. 24.7±0.02 mg QE/g and 82.4±0.01 mg QE/g were the contents of flavonoids in P.acidus and P. emblica ($p>0.05$). TAC values were 524.9±0.01 mg AAE/g (P.emblica) and 1094.5 ±0.02mg AAE/g (P.acidus) ($p>0.05$), Free radical scavenging ability was significantly higher in P.emblica (IC50 =136.03 µg/mL) than P.acidus (IC50 =292.4 µg/mL) ($p<0.05$) emphasizing its remarkable antioxidant power over P.acidus. Both P. emblica and P. acidus inhibited S. aureus in the well diffusion approach compared to disc diffusion with respective zone of inhibitions as 22.7 mm and 23 mm. Nonetheless, the antibacterial efficacy against E. coli was comparatively modest for both leaf extracts at a concentration of 20 mg/mL. Hence, the examined Phyllanthus species exhibited diverse phytochemical profiles and demonstrated substantial antioxidant and antibacterial potential. P. emblica has emerged as a compelling prospect for further investigation owing to its high levels of polyphenols, antioxidant power, and antibacterial properties.

Keywords- Antibacterial, Antioxidant, Leaves, Phyllanthus, Phytochemicals