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In-vitro biological activities of selected medicinal plants and their synergistic effects

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Abstract: The present work aimed to use the methanol extracts of *Croton bonplandianus* (Cb) and *Tithonia diversifolia* (Td) and the synergistic activity of *Croton bonplandianus* and *Tithonia diversifolia* (CbTd) to investigate the phytochemical screening, anti-microbial, anti-oxidant, and anti-inflammatory activities.Phytochemical screening was studied using standard protocols. *In vitro*, biological activities, i.e., antimicrobial, antioxidant, and anti-inflammation, were assayed by using agar disc diffusion, total antioxidant activity, DPPH free radical scavenging, HRBC (human red blood cells) membrane stabilization, and anti-protein denaturation tests. The synergistic approach of the two plants showed maximum levels of phytochemicals, which are rich in antimicrobial, antioxidant, and anti-inflammation activity. *In vitro* antibacterial activity of methanol extracts was done against *Pseudomonas aeroginosa, Escherichia coli, Bacillus subtilis,* and *Staphylococcus aureus* at different concentrations. The maximum zone of inhibition (21 mm) was observed in the combinatorial approach. The maximum inhibition of free radicals is observed in CbTd with a low IC_{50}, i.e., 7.64 mg/ml, followed by Cb with an IC_{50} value of 11.8 mg/ml and Td with an IC_{50} of 28.3 mg/ml. The percentage inhibition of hemolysis and protein denaturation is high in CbTd (93% and 69%). The experimental analysis substantiated the effectiveness of the synergistic effect of two plant extracts with innate anti-microbial, anti-oxidant, and anti-inflammatory agents recommended for utilising them as formulations for the therapy of infectious human pathogens.

Keywords: *Croton bonplandianus* (Cb), *Tithonia diversifolia* (Td), *Croton bonplandianus* and *Tithonia diversifolia* (CbTd), phytochemical screening, antimicrobial activity, antioxidant activity, anti-inflammatory activity.