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Synergistic Antioxidant Interactions Between Solanum melongena and Solanum virginianum: Implications for Ayurvedic Polyherbal Formulations

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Ayurvedic polyherbal formulations are widely recognized for their enhanced therapeutic efficacy, attributed in part to synergistic interactions among constituent plant materials. Eranda Sapthakaya is a traditional formulation commonly used to relieve arthritis-related discomfort. Two of its ingredients, Solanum melongena (SM) roots and Solanum virginianum (SV) dried aerial parts, are known to possess antioxidant phytoconstituents, but their potential interactive effects have not been scientifically evaluated. This study is designed to investigate the synergistic antioxidant interactions between SM and SV extracts using DPPH assay. Hydroalcoholic root extract of S. melongena and ethanolic extract of S. virginianum were prepared via simple maceration. The in vitro antioxidant activities of the individual plant extracts were assessed using the DPPH assay. The 30% inhibitory concentrations (IC_{30}) of SM and SV were 58.22 ± 8.66 and 30.39 ± 3.39 μg/mL respectively, as derived from dose-response curves using linear regression analysis. The two plant extracts were subsequently combined in their IC_{30} ratio (1:1.9) to evaluate the antioxidant potential of the mixture, which demonstrated an IC_{30} value of 20.95 ± 0.93 μg/mL. The calculated combination index (CI) was 0.47, indicating a synergistic interaction between the two plant materials. Isobologram analysis further supported this finding, as the experimental IC_{30} value fell below both the additive line and the theoretical IC_{30} value (44.35 μg/mL). Additionally, the dose-response curve of the SM-SV combination exhibited a leftward shift compared to those of the individual plant extracts, indicating enhanced potency and further confirming the synergistic antioxidant effect of the combination. In conclusion, SM and SV exhibit significant synergistic antioxidant effects, supporting their combined use in traditional formulations such as Eranda Sapthakaya and highlighting their potential for therapeutic applications.

Keywords: Synergism, Solanum melongena, Solanum virginianum, Antioxidant, Isobologram