Feasibility Study of Electrochemical Processing for Value-Added Production of Traditional Chinese Medicine

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Abstract:

Prior studies of COVID-19 treating TCM indicated that electron shuttles could exhibit characteristics of electrochemical catalysis to considerably stimulate efficacy of antiviral treatment. As known, concocting herbal medicine was crucial to maximize such medicinal efficacy. Thus, this first-attempt study proposed novel electrochemical alternatives of herbal processing to optimize herbal contents more concoction-effective and processing-reproducible for disease remedy. Here, three herbal compositions in Shuanghuanglian (SHL) oral liquid (Forsythia suspensa, Scutellaria baicalensis, and Lonicera japonica) were clinically confirmed to own antiviral properties. In fact, concocting significantly influenced whether redox characteristics of TCM could be expressed for efficacious disease treatment. Considering disease-treating electrochemical characteristics, microbial fuel cells (MFCs) coupled with cyclic voltammetry (CV) were used as platforms to quantify bioelectricity-stimulating and electron-transferring potentials of medicinal herbs. CV processing did not decrease of efficacious alkaloids and glycosides commonly observed in traditional processing; however, CV treatment even increased 2.06-fold caffeic acid for F. suspensa. Molecular docking studies confirmed that caffeic acid exhibits a high binding affinity with COX-2, an enzyme involved in the production of prostaglandins, which are associated with inflammation. Apparently, electrochemical methods could provide scientifically reproducible and cost-effective alternatives for novel herbal processing.

Keywords:

COVID-19 Treatment, Electrochemical Processing, Shuanghuanglian, Traditional Chinese Medicine (TCM), Value-Added Production, Circular Economy.