Abstract

Skin aging is a natural biological process characterized by the decline of skin structure and function, accelerated by Ultraviolet (UV) radiation. It disrupts the balance between the synthesis and degradation of extracellular matrix (ECM) components. Matrix metalloproteinases (MMPs), particularly MMP-1 and MMP-9, play a major role in ECM degradation and are upregulated following UV exposure, contributing to skin aging. *Physalis angulata* and *Vitex trifolia* are medicinal plants rich in phenolic compounds which possess antioxidant and potential anti-aging properties. This study evaluated the anti-aging potential of both plants through *in silico* and *in vitro* approaches. Molecular docking analysis showed that none of the metabolites exhibited stronger binding affinity toward MMP-1 or TNF-α than periostat. Chlorogenic acid, quercetin, and rutin from *Physalis angulata*, and luteolin and vitexin from *Vitex trifolia*, demonstrated stronger binding affinity toward MMP-9 than periostat. Phytochemical analysis revealed high phenolic and flavonoid contents, where *Physalis angulata* contained 168.34 ± 0.01 mg GAE/g and 23.33 ± 0.01 mg QE/g, while *Vitex trifolia* contained 37.16 ± 0.02 mg GAE/g and 11.39 ± 0.01 mg QE/g. Gene expression analysis showed that *Physalis angulata* increased MMP-1 and MMP-9 expression by 507% and 698.50%, respectively, under non-UVB conditions, suggesting a pro-oxidative effect. In contrast, Vitex trifolia significantly reduced MMP-1 and MMP-9 expression by 42% and 69%, respectively. These findings suggest that *Physalis angulata* may exert anti-aging effects through MMP-9 inhibition, whereas *Vitex trifolia* may inhibit both MMP expression and enzymatic activity.

Keywords: *Physalis angulata, Vitex trifolia, antiaging, antioxidant*