Abstract

Ultraviolet B (UVB) radiation is a major contributor to skin photoaging and impaired wound healing through the induction of oxidative stress, DNA damage, and inflammatory signaling in keratinocytes. While essential oils have been widely investigated for their protective effects against UV-induced damage, their potential role in promoting cellular recovery following UVB exposure remains insufficiently explored. This study evaluated the cellular recovery effects of Frankincense essential oil (FEO) and Labdanum cistus essential oil (LCEO) in UVB-damaged HaCaT keratinocytes. A sublethal UVB-induced photodamage model was established by optimizing UVB exposure conditions. Following UVB irradiation, cells were treated with predetermined non-toxic concentrations of FEO (200 μg/mL) or LCEO (10 μg/mL). Cellular recovery was assessed using MTS metabolic activity assay, Trypan Blue viable cell counting, and scratch migration assay. Ascorbic acid-2-glucoside (AA-2G) was included as a positive control. Three minutes of UVB exposure produced approximately 50% reduction in viable cell number and was selected for subsequent experiments. LCEO significantly increased viable cell number following UVB-induced damage. However, this effect was not accompanied by improved wound closure in the scratch assay. In contrast, FEO reduced cellular metabolic activity and viable cell number at the tested concentration. Neither essential oil significantly improved wound closure compared with the UVB-only group. These findings suggest that LCEO possesses recovery effects for UVB-damaged keratinocytes primarily through increasing of viable cell number, whereas FEO at the tested concentration appears less suitable for post-UVB recovery. Further studies are required to optimize treatment concentrations and elucidate the underlying molecular mechanisms.

Keywords: *UVB photodamage, HaCaT keratinocytes, Labdanum cistus essential oil, Frankincense essential oil, skin recovery*