

Abstract

Nowadays skin damage has been known to occur not only from ultraviolet exposure but also from the high energy visible (HEV) light called blue light which has a wavelength range of 400 to 500 nm. In fact, the effect of visible light exposure that can be emitted from any electronic device may cause hyperpigmentation, DNA damage, and oxidative stress that leads to skin aging. With its proven risk of damaging the skin, some sunscreen products have raised a claim for the photoprotective capability of their product to protect the skin from exposure to blue light by reflecting and scattering the light. This increase in claims has occurred alongside the current rise in online activity which results in advanced usage of blue light-emitting electronic devices and exposure to blue light. Due to these increasing claims, there is a need to validate them through a scientifically proven and validated method, such as *in vitro* assay using immortalized keratinocyte cells called HaCat cells. During the experiment, the blue light optimization, cytotoxicity, and cytoprotective assay will be done together with MTS and cell counting assay to determine the result. For the sunscreen product used in this experiment, it has been indicated that it is cytotoxic when in direct contact with the HaCat cells, thus can't provide the cytoprotective ability to the cells. However, it may provide a cytoprotective ability up to 1.9x and 2.1x in the MTS assay and cell counting method, compared to the internal control with the concentration of 2 mg/cm² if the product was not in direct contact with the cells.

Keywords: blue light, physical sunscreen, *in vitro*, HaCat cells, cytoprotectivity, MTS assay, cell counting method