Abstract

The idea of anti-aging has become increasingly significant worldwide as people have begun to understand how aging impacts human health significantly. Currently, various synthetic anti-aging agents are available in the market. However, synthetic agents are often associated with several adverse effects. Hence, people are now looking for other alternatives. One of the candidates is secretome from umbilical cord-derived mesenchymal stem cells as it holds a promising effect as an anti-aging agent for advancing skin repair and regeneration. The production of MSC secretomes for a clinical application requires good manufacturing practice techniques, one of which is the freeze-drying process. This study investigated the effect of freeze-drying parameters, which focuses on the primary drying temperatures on the anti-aging potency of freeze-dried secretomes *in vitro* on HaCaT cells through oxidative damage protection test and wound healing assay. The freeze-drying process has successfully increased the shelf life of secretomes. However, the total protein content decreased and some degraded after freeze-drying. Higher protein decreases and protein degradation was found in higher temperature settings during freeze-drying. Additionally, freeze-dried secretomes with the lowest temperature settings showed cytoprotective properties as they protected cells from oxidative damage induced by H_2O_2. With respect to the wound healing property, fresh secretomes show the fastest wound healing progression. Meanwhile, the wound healing property of freeze-dried secretomes decreases as the temperature settings increase. Therefore, primary drying temperatures have been concluded to act as a critical process parameter during the freeze-drying process that will eventually affect the anti-aging potency of freeze-dried secretomes

Keywords: *Freeze-drying; Secretomes; Anti-aging; Cytoprotective; Wound healing; Shelf temperatures*