Abstract

Mesenchymal stem cells (MSCs) have been long studied and developed as a regenerative medicine supported by their secreted bioactive molecules called secretome or MSC-secretome (MSC-S) that contain soluble factors and extracellular vesicles (EVs). Unlike the MSC-based therapy that utilized the whole cells, secretome is a cell-free therapy that would ease the future treatment development as it would not have a rejection reaction to the recipient and the result is similar to the MSC-based therapy. In its native form isolated as a liquid formulation, secretome might have a short shelf life as it cannot withstand the aqueous condition for a long period, especially the proteins that can be denatured thereby degrading its effect as a therapeutic agent. To overcome this, a freeze-drying or lyophilization method was performed as a means to maintain protein stability and increase the shelf life. The freezing time as one of the critical process parameters (CPPs) in the freeze-drying process varied for 24, 12, and 6 hours and the process was carried out with the addition of 8% (v/v) trehalose as the cryoprotectant for secretome. Evaluation on the protein characteristics of lyosecretome showed that the freezing time for 24 hours was able to retain the highest total protein content and a little higher phospholipid concentration although not significant, compared to the 12 and 6 hours. The SDS-PAGE result showed no significant differences from all freezing times but protein degradation was clearly observed when compared to the fresh secretome.

Keywords: *MSC secretome, freeze-drying, freezing time, lyosecretome, protein characteristics*