## Abstract

Fungal infections might pose a serious risk if infected vital organs. Where the common invasive fungal infections are primarily caused by *Candida* species which can lead to candidiasis. Where it has been linked with several other diseases including periodontitis, inflammatory bowel disease, skin and respiratory disorders. During fungal infection, the human body has an immune system that plays a role combating these infections through innate and adaptive responses. However, immunodeficiency patients might not be able to fight the fungal infection efficiently, where those people are more prone to more severe inflammation. Therefore, mesenchymal stem cells, a multipotent cell, emerged as a promising therapeutic approach due to their ability to enhance and modulate the immune responses during fungal infection. This research aims to investigate or compare the role of bone marrow, umbilical cord, and adipose tissue MSCs in modulating immune responses during stimulation with *Candida albicans* and *Candida glabrata* by examining the gene secreted through bioinformatic means and evaluating the immunomodulatory genes such as TLR2, *ICAM1*, *PGES2* and *PTGS2* using qPCR. It shows that stimulation with fungi in MSCs will trigger both proinflammatory and anti-inflammatory genes. Moreover, the BM-MSCs show higher expression in *ICAM1*. UC-MSCs elevate *PTGES2* levels. AD-MSCs show to have high TLR2 and *PTGS2* expression levels. Thus, it is suggested that different MSCs express different anti-inflammatory genes. The one that is able to increase anti-inflammatory activity is the AD-MSCS in response upon stimulation with *Candida albicans* and *Candida glabrata*.



Keywords: *Candida albicans, Candida glabrata, Fungal Infection, Immunomodulation, Mesenchymal Stem Cells, Stem Cells, Toll-Like Receptor 2*