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## THE EFFECT OF *P.urinaria* EXTRACTS ON ADIPOGENIC AND OSTEOGENIC DIFFERENTIATION OF HUMAN UMBILICAL CORD DERIVED (HUC) MESENCHYMAL STEM CELLS (MSCS)

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### ABSTRACT

Mesenchymal stem cells (MSCs) are multipotent stromal cells. They can be differentiated into many cell lineages including osteocytes and adipocytes. *Phyllanthus urinaria* (Rathupitawakka/Chamber bitter) is used to treat gonorrhoea, urogenital diseases and dysentery in Ayurveda. Present investigation was focused on the effect of root and aerial extracts of *P.urinaria* on differentiation of MSCs into osteocytes and adipocytes.

Segments of human umbilical cord were incubated in Dulbecco's Modified Eagle Medium high glucose (15-20 mL) medium supplemented with FBS (10%) until appearance of spindle shape fibroblast like cells. Media changes were carried out in 3-4 days' time intervals. The cells were trypsinized and sub cultured. Toxicity of aqueous extracts of root and aerial parts of *P.urinaria* on MSCs were determined using MTT assay. MSCs were treated with osteogenic and adipogenic differentiation media. Nontoxic concentrations of plant extracts were pre-evaluated for the experiment and 100 µg mL<sup>-1</sup> of each plant extract was used to co-expose with osteogenic and adipogenic differentiation media. Negative controls with normal basal medium as well as with the adipogenic and osteogenic differentiation media were carried out simultaneously. Osteogenic and adipogenic ability were evaluated using alizarin red, and oil red-O assays respectively. The effect of the extracts of root and aerial parts on adipogenic and osteogenic differentiation was compared with the cells cultured in respective differentiation media.

MSCs viability was decreased in a dose dependent manner with root extract (PUR) and aerial (PUA) parts extract of *P.urinaria* indicating toxicity at high concentrations. The percentage cell viability was higher than 90% at 100 µg mL<sup>-1</sup> for both root and aerial parts respectively. PUA showed significantly higher cell viability (p< 0.05) than PUR at 100 µg mL<sup>-1</sup>. Root extract of the plant did not show a significant effect on adipogenesis, however showed an inhibition of osteogenesis (p<0.05). Contrastly, aerial parts inhibited adipogenesis and no significant effect on osteogenic differentiation.

Differentiation of MSCs into osteocytes and adipocytes were inversely correlated. Based on the findings it can be concluded that *P.urinaria* root (PUR) extract decreased the osteogenesis while PUA decreased the adipogenesis. PUA might be a possible lead to treat obesity.

**Keywords:** *P.urinaria*, adipocytes, Osteocytes, mesenchymal stem cells