Justicia gendarussa Ethanolic Extract Enhance Bone Matrix Deposition in *in vitro* study

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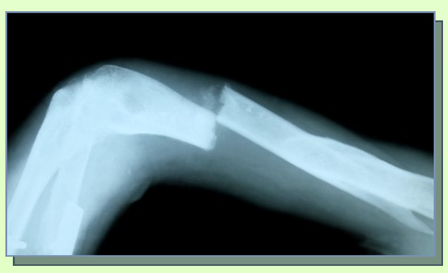
ABSTRACT

Justicia gendarussa (Acanthaceae) or commonly known as Gendarussa has traditionally been used to treat bone fractures. Bone fracture is a clinical condition that need bone repair and new bone formation. To date, the mechanism of *Justicia gendarussa* acting in enhancing the bone mineralization has not been proven scientifically. The present study aimed to investigate the cytotoxicity and alkaline phosphatase (ALP) activity on osteoblast cells when treated with *Justicia gendarussa* ethanolic leaves extract. For cell viability, the result showed that IC_{50} value of the osteoblast cells was 89.1µg/ml. While, ALP assay is used as a biochemical marker for early detection of osteoblast mineralization. The highest amount of ALP activity was at the 37.5 µg/ml when compared to the control. From this study, it shows that *Justicia gendarussa* has potential in enhancing bone mineralization during the bone repair process.

INTRODUCTION

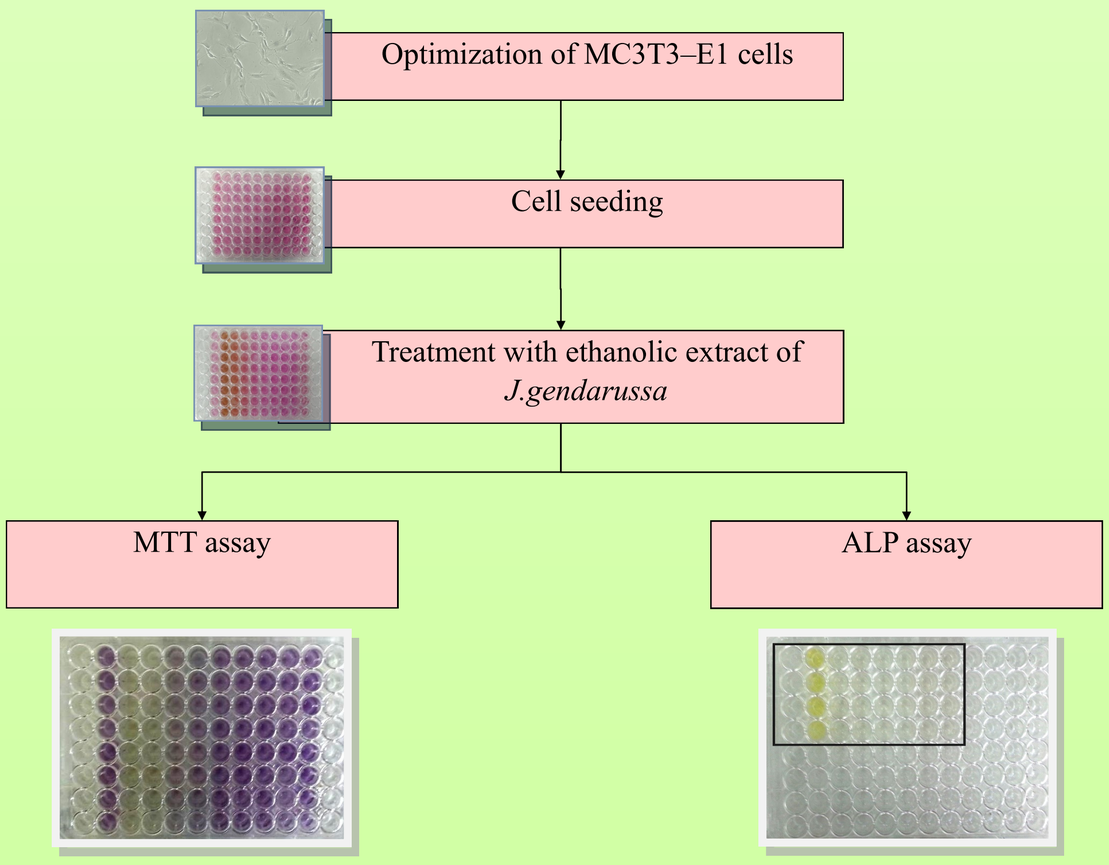
Bone fracture is one of the clinical condition that caused either by trauma like accidents and few diseases like osteoporosis, tumor and deficiency of calcium or vitamin D.[1] Although there are number of treatment, the healing of bone fracture usually takes a longer period, ranging from six to eight weeks.[2] Traditional herbal medicines which have been used in medical practice might play important role in bone fracture healing.[1]



OBJECTIVE

To investigate the cytotoxicity and alkaline phosphatase (ALP) activity of osteoblast cells when treated with ethanolic leaves extract of *J. gendarussa*.

METHOD



RESULTS

Concentration (µg/ml)	Control	7.81	15.63	31.25	62.5	125	250	500	1000
		***	**	***	***	*	***	***	*
% of cell viability	100 ±0.008	72.71 ±0.001	70.94 ±0.009	64.99 ±0.009	61.29 ±0.001	40.96 ±0.005	26.34 ±0.009	16.02 ±0.318	8.68 ±0.012
IC_{50} (µg/ml)					89.1				

Values are mean ± STDEV for three replicates; *p<0.05, **p<0.01 and ***p<0.001 compared with control

Table 1: Percentage of cell viability of MC3T3-E1 cells treated with different concentrations of *J.gendarussa* ethanolic extract.

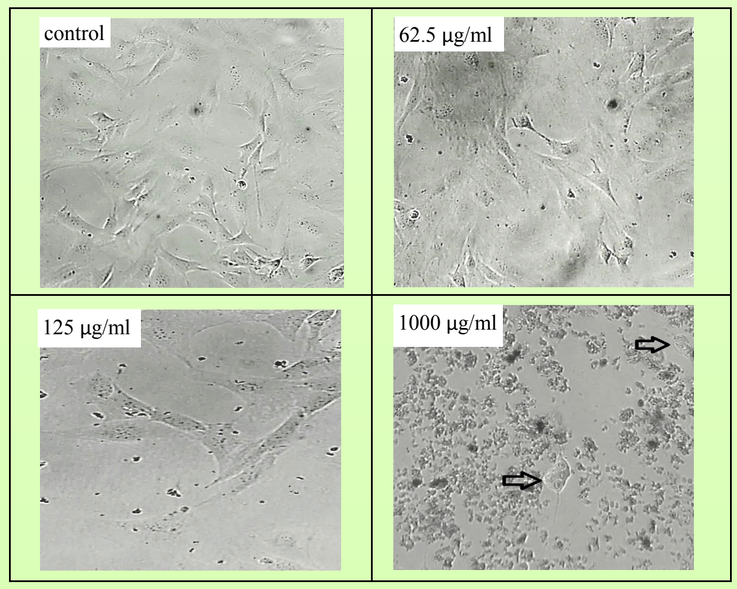


Figure 1: Morphology of MC3T3-E1 cells in MTT assay after 72 hours treated with different concentration of *J.gendarussa* ethanolic extract (200× magnification).

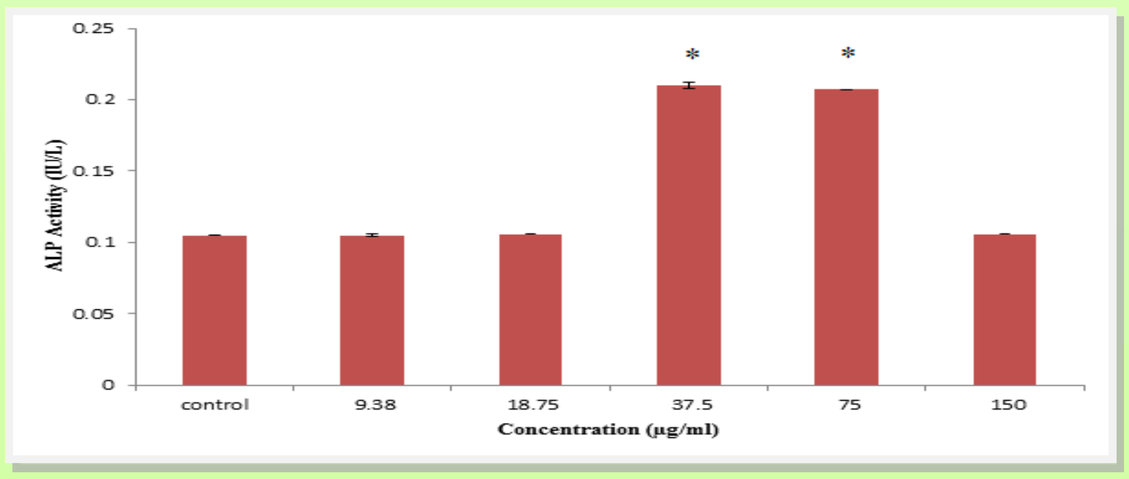


Figure 2: ALP activity of MC3T3-E1 cell treated with different concentrations of *J.gendarussa* ethanolic extract. Values are expressed as the mean±SD for three replicates, *p<0.05 compared with control.

DISCUSSION

The IC_{50} value showed the *J.gendarussa* ethanolic extract is not toxic towards MC3T3-E1 cells. At the highest concentration (1000 µg/ml), morphology of the MC3T3-E1 cells changed into a rounded shape when compared to the control. Based on the result , it is suggested that at lower concentration (below than 100 µg/ml), this plant extract could stimulate the ALP activity in osteoblast cell. ALP is an early marker which used to detect osteoblast cell diffentiation and the ALP activity is elevated when there is increased in osteoblast cell differentiation. [3,4] Differentiation of osteoblast cell to become osteocyte is the final phase of differentiation, where the osteocyte cells embedded in the mineralized bone matrix and forms bone.[5] From this, we can suggest that *J.gendarussa* can increase osteoblastic differention into osteocyte at a specific concentration. Since early stage is a necessary step in bone mineralization, the enhancing effect of *J.gendarussa* may stimulate the bone fracture healing.

CONCLUSION

As a conclusion, this study showed that *J.gendarussa* has potential in increasing the ALP activity in osteoblast cells. Therefore, *J. gendarussa* treatment may be favorable for the bone fracture healing, with a potential mechanism of stimulating the ALP activity in osteoblast cell.

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