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## THE EFFECTS OF *PIPER SARMENTOSUM* ON BONE FRACTURE HEALING: A BIOMECHANICAL STUDY IN OVARIECTOMISED RATS

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### Background:

Osteoporosis affects the biomechanical properties of bone by causing brittleness, therefore increasing the risk of fractures. The biomechanical integrity of bone is essential as it has a structural role in fracture healing. Clinically, mechanical restoration of healed bone is considered as the main target of fracture healing. Oxidative stress is considered to be a pathogenic factor for delayed fracture healing. *Piper sarmentosum* (P.s) is a herb commonly used in Malaysian traditional medicine and is known to possess antioxidant, anti-inflammatory and anticarcinogenic properties. This study aimed to investigate the effects of P.s aqueous extract on fracture callus in osteoporotic female rats by observing changes in the biomechanical properties of the femoral bone.

### Materials and Methods:

Thirty two female Sprague-Dawley rats weighing 200-250gm were assigned into four groups: Sham-operated (SX) group; Ovariectomised-control (VHC) group; Ovariectomised+conjugated equine oestrogen 100 µg/kg/day (OVX+CEE) group; Ovariectomised+P.s extract 125mg/kg/day (OVX+P.s) group. All the rats underwent *mid-diaphyseal closed fracture of the right femur followed by insertion of intramedullary Kirschner wire* 6 weeks post-ovariectomy. Following the fracture, all the rats received the above treatment for another six weeks. The fractured right femora were then harvested and subjected to biomechanical evaluation.

### Results:

There was a significant increase in the mean flexure load, flexure stress and elastic modulus in the OVX+P.s group, compared to the VHC group ( $P < 0.05$ ), however, the mean flexure strain in the OVX+P.s and VHC groups was identical ( $P > 0.05$ ). The biomechanical parameters were found to be identical in the SX, OVX+CEE and OVX+P.s ( $P > 0.05$ ).

### Conclusion:

Supplementation of P.s during fracture healing in osteoporotic bone has contributed to the bone's strength and stiffness rather than to the strain. Since oestrogen is linked to oestrogen dependent tumours, long-term treatment with P.s may be safer than oestrogen replacement therapy in patients with osteoporotic fractures.

### Keywords:

Antioxidant, biomechanics, bone healing, osteoporosis, *Piper sarmentosum*.