

**Summary of the DVM thesis** No: 26214 , Faculty of Veterinary Medicine, Urmia University.

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**Title of thesis:** Biomechanical evaluation of experimental tibial fracture stabilization in dog by Pedicle Screw-Rod method.

**Summary:**

The present study evaluates the mechanical resistance of bone stabilized with Pedicle screw-Rod (PS-R) method and the repaired bone using this method against compressive and bending torque forces. Five male dogs of the same native breed, aged 18 to 24 months and weighing approximately 25 kg, were sourced from the homeless dog shelter in Urmia. The dogs were housed in the veterinary hospital's boarding facility at Urmia University for three months. Following euthanasia, the healthy left tibiae and the repaired tibiae from the intervened limbs using the PS-R stabilization method were harvested and designated as In vivo samples. Additionally, eight fresh, healthy tibiae from four dogs, representing both right and left tibiae, were obtained from the homeless dog shelter in Urmia. Four of these tibiae (the right tibiae) were subjected to a transverse fracture, and a PS-R apparatus was applied, labeling them as Ex vivo samples. All samples were sent to the biomechanics laboratory at Sharif University in Tehran. Samples from both sets underwent uniaxial compression tests and three-point bending tests to measure stress, fracture force, displacement, and elastic modulus (Young's modulus) as biomechanical parameters for evaluation. Within the subgroup for the Charpy test from the In vivo collection, the intervened repaired tibiae (right limb) and the healthy tibia (left limb) of dog number 5 were also assessed. The results from the uniaxial compression and three-point bending tests indicated that the use of this stabilization method provides the necessary strength for tibial repair during the bone healing process. By minimizing the displacement of bone fragments through neutralizing the forces acting on the bone at the fracture site, this method facilitates the completion of the healing process among the fractured segments. The biomechanical findings suggest that the PS-R stabilization method can be proposed as a robust external fixation technique to prevent the displacement of fracture fragments in bone fracture repair.

**Keywords:** External skeletal fixator, Pedicle screw, Biomechanic, Dog, stress, Elastic modulus.