



Comparative Evaluation of Zoledronic Acid, Alfacalcidol, and Propranolol in Pharmacological Correction of Experimental Osteoporosis

Deepak K. KHAJURIA ^{1,2*}, Choudhary DISHA ¹, Rema RAZDAN ¹,
Debiprosad R. MAHAPATRA ² & Moodabidri R. BHAT ²

¹ Department of Pharmacology, Al-Ameen College of Pharmacy, Bangalore 560027, India

² Department of Aerospace Engineering, Indian Institute of Science, Bangalore 560012, India

SUMMARY. Propranolol, a beta-adrenergic receptor blocker, is presently considered to be a potential therapeutic intervention under investigation for its role in prevention and treatment of osteoporosis. However, no studies have compared the osteoprotective properties of propranolol with well accepted therapeutic interventions for the treatment of osteoporosis. To address this question, this study was designed to evaluate the bone protective effects of zoledronic acid, alfacalcidol and propranolol in an animal model of postmenopausal osteoporosis. Five days after ovariectomy, 36 ovariectomized (OVX) rats were divided into 6 equal groups, randomized to treatments zoledronic acid (100 µg/kg, intravenous single dose); alfacalcidol (0.5 µg/kg, oral gauge daily); propranolol (0.1mg/kg, subcutaneously 5 days per week) for 12 weeks. Untreated OVX and sham OVX were used as controls. At the end of the study, rats were killed under anesthesia. For bone porosity evaluation, whole fourth lumbar vertebrae (LV4) were removed. LV4 were also used to measure bone mechanical properties. Left femurs were used for bone histology. Propranolol showed a significant decrease in bone porosity in comparison to OVX control. Moreover, propranolol significantly improved bone mechanical properties and bone quality when compared with OVX control. The osteoprotective effect of propranolol was comparable with zoledronic acid and alfacalcidol. Based on this comparative study, the results strongly suggest that propranolol might be new therapeutic intervention for the management of postmenopausal osteoporosis in humans.

KEY WORDS: Alfacalcidol, Postmenopausal osteoporosis, Propranolol, Rat, Zoledronic acid.

* Author to whom correspondence should be addressed. E-mail: deepak_kumarkhajuria@yahoo.co.in