

<http://www.ncbi.nlm.nih.gov/pubmed/19782781>(Circadian Rhythm Affects the Preventive Role of Pulsed Electromagnetic Fields on Ovariectomy-induced Osteoporosis in Rats (2010). "Pulsed electromagnetic fields (PEMF) have been proved effective in the prevention of osteoporosis both experimentally and clinically. [...] In conclusion, the results indicated that circadian rhythm (CR) was an important factor determining the preventive effect of PEMF on osteoporosis and PEMF exposure in the daytime presented better stimulus efficacy in rats.")

article

Circadian rhythm affects the preventive role of pulsed electromagnetic fields on ovariectomy-induced osteoporosis in rats.

Jing D, Shen G, Huang J, Xie K, Cai J, Xu Q, Wu X, Luo E.

Author information

Abstract

Pulsed electromagnetic fields (PEMF) have been proved effective in the prevention of osteoporosis both experimentally and clinically. Chronotherapy studies have shown that circadian rhythm (CR) played an important role in the occurrence, development and treatment of several diseases. CR has also been recognized as an essential feature of bone metabolism. Therefore, it is of therapeutic significance to investigate the impact of CR on the efficacy of PEMF in the prevention of osteoporosis. However, this issue has never been discussed previously. The objective of this study was to systematically evaluate the impact of CR on the preventive effect of PEMF on osteoporosis in rats. Thirty-two 3 month old female Sprague-Dawley rats were randomly divided into four different groups: sham-operated control (Sham), ovariectomy (OVX), OVX with PEMF stimulation in daytime (OVX+DPEMF) and OVX with PEMF stimulation in nighttime (OVX+NPEMF) groups. The OVX+DPEMF and OVX+NPEMF groups were subjected to daily PEMF exposure on the 2nd post-operative day, from 9:00 to 15:00, and 0:00 to 6:00, respectively. After

12 weeks, the OVX+DPEMF group presented better efficacy in prevention against OVX-induced bone loss and deterioration of trabecular bone architecture compared with the OVX+NPEMF group. This was evidenced by the increased levels of femoral bone mineral density, trabecular area percentage, trabecular thickness, trabecular number and decreased trabecular separation. Furthermore, the bone turnover biomarkers (serum alkaline phosphatase, serum bone Gla protein and urinary deoxypyridinoline) and the dynamic histomorphometric parameters reflecting the trabecular osteoblast and osteoclast activity (bone formation rate with bone volume as referent, osteoclast number, etc.) in the OVX+DPEMF group decreased to a larger extent compared with the OVX+NPEMF group. In conclusion, the results indicated that CR was an important factor determining the preventive effect of PEMF on osteoporosis and PEMF exposure in the daytime presented better stimulus efficacy in rats. The findings might be helpful for the efficacious use of PEMF mediations, evaluation of PEMF action and experimental design in the future studies of biological effect of electromagnetic fields.

(c) 2009 Elsevier Inc. All rights reserved.

PMID: 19782781 [PubMed - indexed for MEDLINE]