**LED Photobiomodulation therapy combined with biomaterial as a scaffold promotes better bone quality in the dental alveolus in an experimental extraction model.**

The loss of the dental element causes deformity and bone atrophy, on the other hand bone grafting immediately after tooth extraction will enable rehabilitation with implants to restore mastication and aesthetics. Photobiomodulation accelerates bone healing, activating osteoblasts, decreasing osteoclastic activity and improving the integration of the biomaterial with bone tissue. The aim of the study was to evaluate the effect of photobiomodulation (LED ʎ=850nm) on the bone quality of Wistar rats submitted to molar extraction with and without bone graft with hydroxyapatite biomaterial (Straumann® Cerabone®). Forty-eight rats were divided into five groups (n = 12): Baseline (no interventions); control (extraction); LED (extraction + LED); biomaterial (extraction + biomaterial) and biomaterial + LED (extraction + biomaterial + LED). Euthanasia occurred 15 and 30 days after extraction induction. The ALP analysis showed improvement in bone formation in the control and biomaterial + LED groups in 15 days (p = 0.0086 and p = 0.0379. In addition, the LED group had better bone formation compared to the other groups at 30 days (p = 0.0007, Bonferroni). In the analysis of AcP, all groups had lower resorption compared to the baseline group. Bone volume increased in the biomaterial, biomaterial + LED and basal groups compared to the control group at 15 days (p < 0.05, t test). At 30 days, the basal group had greater volume compared to the control and LED groups (p < 0.05, t test). The LED combined with the biomaterial improved bone formation in the histological analysis and decreased bone degeneration, promoting an increase in bone density and volume. In conclusion, LED may be an important therapy to be combined with biomaterials to promote bone formation, along with other known benefits of this therapy, such as pain control and the inflammatory process.

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