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Letter to the Editor

Tooth Movement in Orthodontic Treatment with Low-Level Laser Therapy: Systematic Review Imprecisions

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Dear Editor,

After thorough examination of the article written by Carvalho-Lobato et al.[1] ''Tooth Movement in Orthodontic Treatment with Low-Level Laser Therapy: A Systematic Review of Human and Animal Studies,'' there are some inconsistencies that could mislead readers who show interest in such a broad subject. This is why we feel the need to clarify certain aspects contained in the article. When properly conducted, systematic reviews (SRs) and meta-analyses are ranked high in the pyramid of evidence, and their results can influence clinical decisions and serve as a foundation for evidence-based practice guidelines. However, SRs can be prone to biases originating from poor quality of the included studies, heterogeneity among studies, and possible publication biases.[2]

Then, to include animal studies in a systematic review, takes the article apart from any clinical use, and denies the possibility of providing conclusions about human effects. Also, these types of studies are not included on the evidence scale, or they are classified below expert opinions.[3–5]

Additionally omitting important articles as mentioned by Carroll,[6] in the Materials and Methods sections, the authors claim that human and animal studies in which low-level laser therapy (LLLT) was applied to increase dental movement were going to be reviewed and included in the article. Animal studies included that be Abi-Ramia et al.,[7] in which the purpose was to describe microscopically the pulpal reactions resulting from orthodontically induced tooth movement associated with LLLT in rats, not the increase of the speed of the dental movement reducing the entire treatment time. The specimens were examined with a light microscope, and photomicrographs of representative areas were taken for qualitative analysis of pulpal structures, cells, and blood vessels. The related results showed an increase in the vascularization that corresponded to the pulp tissue, not even the periodontal ligament; therefore, it should not have been included in the biological analysis made by the authors trying to explain the acceleration effect of LLLT on the orthodontic movement.

On the exclusion criteria, the authors clearly state that literature reviews and reports with no direct orthodontic movement measurements were excluded, but the Abi-Ramia et al.[7] study does not include any measurements post-orthodontic movement.

In the Discussion section, the paragraph that states ''the irradiation has an accumulative effect that means that part of the administered dose may accumulate in the next irradiation. Therefore, researchers should be cautious not to exceed the biostimulating dose range or reach the inhibition range'' lacks the appropriate support based on human studies.

In our study, we found a 30% increase on orthodontic movement with a prospective cohort in which the patients were irradiated at every appointment during treatment time, and the differences found were statistically significant. Also, the same protocol was applied to search for pulp effect and pain control, and the results were satisfactory.[8–10]

The Discussion section also states that one study performed radiographic measurements (computed microtomography), referring to Ozawa et al.[11] In this study, the objective was ''to determine the target cells responsible for the action of laser irradiation and the roles of irradiation on these cells during bone formation, we investigated the effects of low-energy laser irradiation at various cell culture stages of cellular proliferation, bone nodule formation, alkaline phosphatase activity, and osteocalcin gene expression, employing rat calvarial cells,'' and the results obtained were on culture dishes. In the last part of the Discussion, they also suggest that ''in human studies, we should be cautious when evaluating the measurements, because of the systemic effects of phototherapy,'' referring to the study made by Yamagishi et al.,[12] but clearly this study concludes that ''percent transmittance of either human or ox mandibular cortical bone in 1.0 mm thickness reached approximately 50%.'' Human venous blood indicated low level of the transmittance as compared with other tissues. According to the results of analysis on power distribution, the laser beam seemed to be attenuated by absorption rather than by scattering. Attenuation of the laser beam in accordance with the thickness was similar to the graph which led to Kubelka-Munk's formula for the attenuation of scattering light.''

At the end of the Discussion, they quoted ''in human studies, the contralateral canines were used as a control, and it is uncertain if the applied dose may have had an effect on that area. Patients were their own controls in order to reduce the variability and allow a smaller number of patients in the sample,'' here again referring to the Abi-Ramia et al,[7] report, which is not in humans, it's in rats. The split mouth design for laser application has shown increased movement speed in

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human canines using one side as a control and the other as experimental, as described by Cruz et al.,[13] Sousa et al.,[14] and Doshi–Mehta.[15]

We hope in a near future to have more randomized clinical control trials, and trials that allow a thorough meta-analysis of this subject, to be able to establish adequate, safe, and effective protocols for clinical use.

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