Preventive Effect of Atmospheric Cold Plasma on Alveolar Bone Loss in Experimental Periodontitis in Rats

P-BR- 188
Basic research

Hakan ÖZDEMİR*, Başak ŞEKER*, Suna SAYGILI#

* Osmangazi University, Faculty of Dentistry, Department of Periodontology, Eskişehir, Turkey

Health Science University, Faculty of Medicine, Department of Histology and Embriology, Kütahya, Turkey

Background and Aim: Periodontitis, which affects much of the world's adult population, is a destructive, inflammatory, pathological condition that affects the connective tissue attachment between the alveolar bones of the teeth. Plasma is the fourth state of matter and consists of neutral ionized gas, electrons, ultraviolet radiation and free radicals under normal pressure. Although it is used in many fields, the use of cancer patients, chronic infection wound and accelerating wound healing.

The purpose of this study was to analyze the morphometric and histopathologic changes associated with experimental periodontitis in rats in response to the local administration of atmospheric cold plasma.

Materials and Metods

Thirty male Wistar albino rats were used in the current study. The rats were randomly divided into three groups of ten rats each:

Nonligated (NL) group; Ligature-only (L) group; Atmospheric cold plasma (ACP) group. In the study, cold atmospheric plasma kINPen 09 plasma jet used for 11 days. Silk ligatures were placed at the gingival margin of the lower first molars in a mandibular quadrants.

The study duration was 11 days, and the animals were sacrificed at the end of this period. Changes in alveolar bone levels were clinically measured, and tissues were histopathologically examined to assess the differences among the study groups.

Results

Alveolar bone loss around the mandibular molar tooth was significantly higher in the LO group compared with ACP and NL group ($p < 0.05$). The ratio of osteoclast numbers was significantly higher in the LO group than in the NL and ACP group ($p < 0.05$). Osteoblastic activity was significantly lower in the LO group than in the ACP group ($p < 0.05$).

Figure 1: **A:** Normal mandibula, showing alveolar bone (a), periodontal ligament (p), and dentin (d), **B:** Mandibula after 11 days of periodontitis; mainly alveolar bone with numerous osteoclasts (arrow) **C** and **D:** Mandibular after 11 days of periodontitis treated with ASP, showing reduction in osteoclast number (Hematoxylin and Eosin; original magnification: A,x25;B, x100; C and D x50)

Figure 2: Mean alveolar bone loss in the study groups. ASP application prevented bone loss with increased doses. ^a $p < 0.05$ versus the ASP and NL.

Figure 3: Osteoclast number NL, LO and ASP groups. ^a $p < 0.05$ versus the ASP and NL.

Conclusion and Clinical Implications

The findings of this study provide morphologic and histologic evidence that atmospheric cold plasma, when administered locally, prevents alveolar bone loss in the rat model.