**Background:** This study aims to investigate the effects of a 2% cholesterol-enriched diet on alveolar bone loss (ABL) and serum levels of pro-oxidants and antioxidant enzymes in rats with experimental periodontitis.

**Methods:** Rats were randomized into the four groups: 1) group C (standard diet/periodontally healthy); 2) group Hc (high-cholesterol diet); 3) group HcP (high-cholesterol diet/periodontitis); and 4) group P (standard diet/periodontitis). All rats were fed for 8 weeks. At 6 weeks, experimental periodontitis was induced. At the end of week 8, the rats were sacrificed. Histomorphometric and histopathologic analyses were performed. Malondialdehyde (MDA), nitric oxide (NO), superoxide dismutase, and glutathione peroxidase (GPX) levels in serum were measured with enzyme-linked immunosorbent assay.

**Results:** Experimental groups exhibited increases in: 1) total cholesterol, 2) low-density lipoprotein, and 3) high-density lipoprotein compared to group C. The cholesterol-enriched diet induced ABL in group Hc; groups HcP and P had more extensive ABL. The most polymorphonuclear leukocyte infiltration in periodontal tissues was found in group HcP. MDA levels were higher in all experimental groups than in group C, but significant in the HcP group. A high-cholesterol diet, with or without periodontitis, resulted in more decreases in GPX and more increases in NO compared to group P.

**Conclusion:** Although any additive effect of cholesterol-enriched diet to ABL was not found in rats with ligature-induced experimental periodontitis, these findings revealed that a cholesterol-enriched diet could lead to ABL and an increase in periodontal inflammation and serum pro-oxidants.

**KEYWORDS:** Alveolar bone loss, cholesterol, glutathione peroxidase, malondialdehyde, oxidative stress, periodontitis