Aim: This study aimed to evaluate the effects of rosuvastatin on alveolar bone loss (ABL) and oxidative status in ligature-induced periodontitis. Material and Methods: Thirty-nine male Wistar rats randomly divided into 4 groups: nonligated group (NL); nonligated+rosuvastatin group (RSV); ligated group (LO); and ligated+rosuvastatin group (L+RSV). All rats were treated with water or rosuvastatin by oral gavage until sacrifice and in the LO and L+RSV groups periodontitis was induced by ligature for 14 days. ABL was determined by histomorphometric and histological analysis. Serum malondialdehyde (MDA), superoxide dismutase (SOD), glutathione (GSH), glutathione peroxidase (GSH-Px), and nitric oxide (NO) concentrations were evaluated by ELISA. Results: Administration of rosuvastatin significantly reduced ABL in the L+RSV group compared to the LO group (p < 0.05). MDA concentrations were statistically higher in the LO group than the NL group (p < 0.05) and there was not statistically significant difference between the NL and L+RSV groups (p > 0.05). NO levels were higher in the RSV group than NL group, and in the L+RSV group than the LO group (p < 0.05). GSH levels were significantly higher in the LO and L+RSV groups compared to the NL group (p < 0.05). There were no significant differences among the study groups regarding SOD and GSH-Px levels. Conclusion: Our findings suggest that rosuvastatin reduces alveolar bone loss and improves oxidative status in ligature-induced periodontitis. The antioxidant effects of rosuvastatin may result from decreasing MDA, and increasing NO and GSH rather than SOD and GSH-Px.