Ghrelin is a peptide hormone that has modulatory effects on the immune system. This study was designed to evaluate plasma ghrelin levels in patients with chronic periodontitis and to investigate if a relationship exists between ghrelin and periodontal parameters, serum cytokines, and bone turnover markers. Thirty-five chronic periodontitis patients (CP) and periodontal healthy individuals (C) were included in this study. Periodontal parameters were recorded. Blood samples were obtained to determine the levels of total and acylated ghrelin, interleukin-1 beta (IL-1β), tumor necrosis factor-alpha (TNF-α), the soluble receptor activator nuclear factor kappaB ligand (sRANKL), alkaline phosphatase (ALP), and osteocalcin (OSC). Plasma levels of total and acylated ghrelin were significantly elevated in the CP group compared with the C group (p < 0.05). The difference was significant only between males in the two groups (groups were compared with respect to gender) (p < 0.05). There was no difference between the groups regarding the levels of serum sRANKL, TNF-α, and ALP. A relative increase in the serum levels of IL-1β and a decrease in the serum levels of OSC of the CP group were observed (p < 0.05). In addition, positive correlations between total ghrelin/ALP and total ghrelin/acylated ghrelin were discovered. We found no direct correlation between ghrelin levels and periodontal parameters. Our results indicate an increase of total and acylated ghrelin levels in patients with chronic periodontitis. Further, studies in larger populations (which could include ghrelin levels in gingival tissue, gingival crevicular fluid, and saliva) are needed in order to confirm the role of ghrelin in periodontal disease.