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And Scientific Research
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College of Dentistry**



**Evaluation of Single Nucleotide Polymorphisms
of Vitamin D Receptor Gene and their
Association with *Porphyromonas gingivalis* in
Patients with Severe Chronic Periodontitis**

A Thesis

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Abstract

Background: Periodontitis is a chronic disease believed to have a complex multifactorial aetiopathogenesis. Microbiological factors interact with genetic and environmental factors to determine disease onset and progression. *Porphyromonas gingivalis* is a major pathogen of severe adult periodontitis contributes to the pathogenesis by establishing an activation loop with proinflammatory cytokine interleukin-12 to augment the inflammation in relation to the immunopathology of periodontitis. Vitamin D, a fat-soluble secosteroid, interacts with its nuclear receptor (vitamin D receptor) to regulate crucial biological processes, such as bone metabolism and immune function modulation.

Aims of Study: This study was performed to clarify whether polymorphisms in vitamin D receptor gene are associated with the incidence of severe chronic periodontitis in Iraqi patients, as well as to study the role of vitamin D and interleukin-12 serum levels in the pathogenesis of chronic periodontitis and gene-environment interaction by quantifying *Porphyromonas gingivalis* bacteria in dental plaque.

Materials and Methods: A case-control study was performed on ninety six age and gender matched Iraqi Arab subjects (51 with severe chronic periodontitis and 45 apparently healthy controls) with ages range from 30-50 years. Clinical parameters used in this study were, number of lost teeth, plaque index, gingival index, bleeding on probing, probing pocket depth, and clinical attachment level. Blood and dental plaque samples were collected from all patients and controls, *Porphyromonas gingivalis* quantification from extracted DNA of dental plaque samples, performed by means of real-time polymerase chain reaction and then DNA was extracted from blood samples for vitamin D receptor polymorphisms genotyping by polymerase chain reaction- sequencing methods. While enzyme-

linked immunosorbent assay was carried out to estimate the serum level of vitamin D and interleukine-12 in studied groups.

Results: The study results revealed a highly significant reduction in vitamin D serum level in patients group than controls (P=0.000). While, interleukin-12 and the quantity of *Porphyromonas gingivalis* were significantly higher in patients than in healthy controls (P=0.002 and P=0.000 respectively). Vitamin D shows negative significant correlation with bleeding on probing. Moreover, *Porphyromonas gingivalis* set a positive significant correlation with clinical parameters and interleukin-12 serum level. On the other hand, this study showed that the frequency of vitamin D receptor rs 731236 was significantly higher in patients as compared to controls with (P=0.000, OR=3.181), while the frequency of rs 11574114 was non-significantly decreased in patients than controls (OR=0.44) confirmed subsequently by negative significant association with clinical attachment loss. Negative significant correlation also noticed between rs 7975232 and vitamin D serum level, whereas, positive significant correlations regarding rs 731236 with interlukine-12 serum level and rs11574113 with clinical attachment loss of patients group. Interestingly, the results indicated that significant correlation among all vitamin D receptor polymorphisms in both study groups were found, while no association was found between rs 11574114 and the rest of polymorphisms in patients group.

Conclusions: This study demonstrates that vitamin D receptor –rs 731236 genotypes and alleles are risk factors and may contribute to the increased susceptibility to severe chronic periodontitis. In addition rs 7975232 have negative impact on serum vitamin D level. Moreover, serum levels of vitamin D and interleukin-12 play a crucial role in the pathogenesis of periodontitis. Finally, the positive significant correlations of rs 731236 and *Porphyromonas gingivalis* with interleukin-12 suggesting a synergistic interaction among them.