The effect of non-surgical periodontal therapy on systemic immune response and blood glucose level of NIDDM patients

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Abstrak

Inflamasi periodontal merupakan kelainan periodontal dengan prevalensi tinggi di masyarakat. Periodontitis kronis dipengaruhi oleh akumulasi plak dan kalkulus sebagai faktor local, ditambah faktor sistemis misalnya diabetes mellitus (DM) dan infeksi HIV. Sitokin terutama IL-1β sebagai mediator inflamasi utama penyakit periodontal, menstimulasi ekspresi iNOS (inducible nitric oxide synthase) dan produksi NO (nitric oxide) oleh sel β, menyebabkan disfungsi sel β. Leukotoksin dan protease yang dihasilkan patogen periodontal menyebabkan jejas kemotaktik dan fagositotik, dan menurunkan fungsi fagositosis PMN. Hiperglikemia pada penyandang DM menyebabkan peningkatan kadar kalsium sitosol (Ca2+), yang menyebabkan disfungsi PMN dan menurunkan fungsi fagositosis. Advanced glycosilation endproduct pada DM tipe 2 berikatan dengan monosit menyebabkan peningkatan sitokin proinflamasi (IL-1, TNFα) dan menyebabkan aktivasi makrofag dan osteoklas. Hiperglikemia menyebabkan aktivasi diasil gliserol (DAG)-protein kinase C (PKC), yang menyebabkan peningkatan PGE2 dan ekspresi sitokin yang mempengaruhi proses inflamasi dan destruksi. Penelitian tentang pengaruh scaling (pembersihan karang gigi sebagai tindakan non-bedah pada terapi periodontal) pada penyandang DM terhadap kadar gula darah dan respons imun selular belum pernah dilakukan di Indonesia. Penelitian ini bertujuan menganalisis pengaruh pembersihan karang gigi terhadap kadar IL-1β, fungsi fagositosis PMN dan kadar glukosa darah penyandang DM tipe 2. Subyek penelitian adalah penyandang DM tipe 2, 60 penyandang DM Terkendali dan 60 penyandang DM Tidak Terkendali di Poliklinik Metabolik-Endokrin RSUPN Ciptomangunkusumo, umur 40-60 tahun. Subyek dibagi menjadi kelompok perlakuan dan kelonpok tanpa perlakuan, untuk menilai respons imun selular dan status DM, sebelum dan 6 minggu sesudah perlakuan. Analisis statistik (t test) dengan komputer menggunakan perangkat Stata 7,0 dilakukan untuk membandingkan parameter sebelum dan sesudah scaling pada kedua kelompok. Hasil penelitian menunjukkan bahwa scaling dapat menurunkan kadar IL-1β dan meningkatkan fungsi fagositosis secara bermakna (P<0,05), menurunkan kadar glukosa puasa, glukosa 2 jam PP dan kadar HbA1c, tetapi penurunannya secara statistik tidak bermakna (P>0,05), kecuali penurunan kadar HbA1c pada DM Tidak Terkendali (P=0,00).
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Abstract
Periodontal inflammation is a periodontal disorder of high prevalence in the population. Chronic periodontitis is associated with the accumulation of plaque and calculus as local factors, and systemic factors such an diabetes mellitus (DM) and HIV infection. Cytokine, especially IL-1β as inflammatory mediator for periodontal disease, may directly stimulated iNOS (inducible nitric oxide synthase) expression and NO (nitric oxide) production by β-cells, resulting in NO-mediated β-cell damage. The leucotoxin and proteases produced by periodontal pathogens will induce chemotactic and phagocytotic defect; therefore causing decreased PMN phagocytotic function. Hyperglicemia which occurs in diabetic patients increases calcium influx to the cell, resulting in the increased cytosol?s calcium ([Ca 2+]i) level

and; therefore, resulting in dysfunction of PMN and impaired PMN phagocytotic function. Advanced glycosilation endproduct in NIDDM binds to monocytes resulting in the increase of pro-inflammatory cytokines (IL-1, TNFβ) and produces activation of macrophages and osteoclasts. Hyperglicemia activates diacyl glycerol (DAG)-protein kinase C (PKC), thus increasing PGE2 and cytokine expression that induce inflammation and periodontal tissue destruction processes. Studies on the effect of scaling to remove calculus disposition on blood glucose control and cellular immune response in DM patient has never been carried out. The aim of the study was to analyze the effect of scaling as non-surgical periodontal therapy on immune response (IL-1β level and PMN phagocytotic function) and blood glucose level of type 2 diabetic patients. Subjects were diabetic patients, 60 controlled-DM (CDM) and 60 uncontrolled-DM (UCDM), in Metabolic-Endocrinology Clinic of Ciptomangunkusumo Hospital, aged 40-60 years. The subjects were divided into treatment (scaling) and control group, and cellular immune response and diabetic status, before and 6 weeks after treatment were evaluated. Statistical analysis (t test) were done using Stata 7.0 software, to compare the parameters before and after scaling in CDM and UCMD subjects. The results showed that scaling decreased IL-1β level and increased phagocytotic function significantly ($P<0.05$). Scaling decreased fasting and 2 hours post-prandial blood glucose levels and HbA1c level, but the decrease were not significant statistically ($P>0.05$), except for the decrease in HbA1c level in uncontrolled DM ($P=0.00$).