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Impact of periodontal status on oral health-related quality of life in patients with and without type 2 diabetes

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ABSTRACT

Objectives: To investigate the impact of periodontal status on oral health-related quality of life (OHRQoL) in patients with and without type 2 diabetes mellitus (T2DM).
Methods: 61 patients with T2DM and 74 non-diabetic patients matched for age, gender and periodontal status (health, gingivitis, chronic periodontitis) were recruited. The oral health impact profile (OHIP)-49 was self-completed by all participants at baseline and by the patients with periodontitis at 3 months and 6 months after non-surgical periodontal therapy.
Results: There were no significant differences in the overall OHIP-49 summary scores between patients with T2DM (median; interquartile range; 37.0; 19.5–61.0) and without T2DM (30.4; 16.8–51.0) ($p > 0.05$). Among non-diabetic patients, there were significantly higher OHIP-49 scores (indicating poorer OHRQoL) in patients with gingivitis (41.0; 19.7–75.7) and periodontitis (33.0; 19.9–52.5) compared to patients who were periodontally healthy (11.1; 7.1–34.5) ($p < 0.05$), though such an effect was not observed in the patients with diabetes. In the non-diabetic patients with periodontitis, statistically significant reductions in OHIP-49 scores were noted in the psychological discomfort and psychological disability domains following periodontal treatment, indicating an improvement in OHRQoL. In contrast, there were no statistically significant changes in OHIP-49 scores following periodontal treatment in the patients with diabetes.
Conclusion: T2DM does not impact on overall OHRQoL as measured by OHIP-49. Chronic periodontitis and gingivitis were associated with poorer OHRQoL in non-diabetic patients, with evidence of improvements following periodontal treatment, but no such effects were observed in patients with diabetes.
Clinical significance: Gingivitis and periodontitis are associated with reduced OHRQoL compared to periodontal health in non-diabetic patients, with improvements following treatment of periodontitis. No impact of type 2 diabetes on OHRQoL was noted; this may be related to the burden of chronic disease (diabetes) minimising the impact of oral health issues on OHRQoL.

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1. Introduction

Periodontitis is a common chronic inflammatory disease that affects the supporting structures of the teeth. Periodontal inflammation is initiated and perpetuated by the subgingival bacterial biofilm, but the tissue damage which occurs derives mainly from the host immune-inflammatory response to the bacterial challenge. Certain systemic diseases are associated with increased susceptibility to periodontitis, for example, the presence of diabetes is associated with a 2–3-fold increased risk, particularly if poorly controlled.[1] The rise in the prevalence of diabetes in most populations, including in the UK, is mainly attributed to an increase in type 2 diabetes mellitus (T2DM).[2] T2DM is associated with insulin resistance i.e. the inability of the body to respond normally to insulin and inability of the β-cells of the pancreas to produce sufficient insulin. The multifactorial aetiology and chronic inflammatory nature of both diabetes and periodontitis highlight the complexity of the relationship between the two conditions.[3]

Both periodontitis[4,5] and diabetes[6,7] have been reported to have negative impacts on aspects of daily living and health-related quality of life. Evidence suggests that oral health problems can adversely affect an individual's physical functioning, social standing and wellbeing, and that it can be difficult to dissociate oral health from general health with regards to impacts on quality of life.[8–10] Oral health-related quality of life (OHRQoL) can be assessed using the oral health impact profile-49 (OHIP-49) questionnaire.[11] This contains 49 items within 7 domains (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, handicap), with responses ranging from score 0 indicating 'never' to score 4 indicating 'very often'. Domain scores are generated by summing the response scores to the items within the domain, and an overall summary score is generated by summing the response scores to all 49 items. A higher score is indicative of poorer OHRQoL. Our group has previously identified, when using OHIP-49, that patients with chronic periodontitis report significantly poorer OHRQoL compared to patients without periodontitis, with significant functional, social and psychological impacts on OHRQoL.[12]

Considering that OHRQoL measures are increasingly used in assessing patient-centred outcomes of disease and treatment, and in view of the close inter-relationship between periodontitis and T2DM, it is important to explore the impact of periodontal status and treatment on OHRQoL in patients with T2DM. The aim of this study was to use OHIP-49 to assess OHRQoL in patients with diabetes and periodontitis, and to evaluate any impact of periodontal treatment.

2. Materials and methods

Adult participants with T2DM were recruited from primary and secondary care diabetes clinics in Newcastle upon Tyne, UK. Written informed consent was obtained from all participants prior to recruitment. The non-diabetic control group was recruited from patients attending Newcastle Dental Hospital, UK, matched according to age, gender and periodontal status. Participants were assigned a diagnosis of periodontal health (no probing depths >4 mm, bleeding on probing (BOP) ≤15%, no attachment loss), gingivitis (no probing depths >4 mm, BOP >15%, no attachment loss), or chronic periodontitis (≥6 sites with probing depths ≥5 mm on separate teeth, with attachment loss and alveolar bone loss confirmed on X-ray). Exclusion criteria included immunosuppression, pregnancy, conditions requiring prophylactic antibiotic treatment prior to dental treatment, bleeding disorders, and any prior non-surgical treatment for periodontal disease in the past 6 weeks. Ethical approval was granted by the UK National Research Ethics Service (Ref. 06/Q0904/8).

The periodontal examination was performed by a single examiner using a UNC PCP15 manual periodontal probe. Parameters recorded included plaque index (PI),[13] modified gingival index (mGI),[14] probing depth (PD), and percent BOP. Patients with periodontitis received standard non-surgical periodontal therapy utilising a full mouth debridement approach with local anaesthetic typically over 2 visits, together with oral hygiene instruction personalised to their clinical situation. Early periodontal maintenance follow-up appointments were provided at 3 and 6 weeks, including further prophylaxis to disrupt the biofilm and reinforcement of oral hygiene instructions. Definitive periodontal maintenance care appointments were provided at 3 months and 6 months. Patients with periodontal health or gingivitis received oral hygiene instruction and prophylaxis at the screening appointment only, and were not followed up thereafter.

OHIP-49 was used to assess OHRQoL. All participants self-completed the questionnaire at the screening appointment prior to any treatment being provided. The patients with periodontitis additionally completed the questionnaire again at 3 months and 6 months following the periodontal therapy.

The null hypotheses in this study were that (i) there would be no differences in OHRQoL between diabetic and non-diabetic patients with different periodontal conditions (health, gingivitis, chronic periodontitis) and (ii) that there would be no impact of periodontal treatment on OHRQoL. All data were analysed using SPSS 21.0 statistical software. Patients who had not responded to ≥10% of the items in OHIP-49 were eliminated from the study. For patients who had <10% missing responses, the answers to the missing items were derived using group mean score imputation for each item in order to calculate the individual domain scores and the summary scores as reported previously.[12,15] Data were tested for normality using the Kolmogorov–Smirnov test. The medians and interquartile ranges for non-parametric variables and means and standard deviation for parametric variables were determined. For cross-sectional analyses for discrete variables, the Chi-squared test was used to compare between groups. The Mann–Whitney test was used for comparisons of OHIP-49 scores between the groups with and without T2DM based on the periodontal status. The Kruskal–Wallis test with post hoc Mann–Whitney tests was used to analyse the OHIP-49 data within the groups with and without T2DM based on the periodontal status. The Friedman test with post hoc Wilcoxon Signed Rank tests was used for longitudinal comparisons of the effects of periodontal treatment. Cronbach's alpha was used to calculate the internal consistency of the questionnaire.