

High Prevalence of Periodontal Disease Observed in Patients on Hemodialysis: A Call for Equitable Access to Dental Care



Kajal Kotecha¹, Rebecca Ridout¹, Mira Shah¹, David W. Randall², Vanessa Sousa³, Ravindra Rajakariar², Kieran McCafferty², Muhammad M. Yaqoob² and Lochana Nanayakkara¹

¹Institute of Dentistry, The Royal London Dental Hospital and Institute, Barts Health NHS Trust, Queen Mary University of London, London, UK; ²Department of Renal Medicine and Transplantation, Royal London Hospital, Barts Health NHS Trust, London, UK; and ³Centre for Host-Microbiome Interactions, Periodontology and Periodontal Medicine, Faculty of Dentistry, Oral and Craniofacial Sciences, Kings College London, Guy's Hospital, London, UK

Correspondence: David W. Randall, Royal London Hospital, Whitechapel Road, London, E1 1FR, UK. E-mail: d.randall@qmul.ac.uk

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INTRODUCTION

Periodontal disease is a common, multifactorial chronic inflammatory disease of the gums and tooth-supporting apparatus, associated with loss of teeth, systemic inflammation and increased mortality.¹ Various factors may contribute to the development of periodontal disease in patients with chronic kidney disease (CKD), including altered immune system function, CKD mineral and bone disease, oral dysbiosis, poor oral hygiene, and the presence of comorbidities such as diabetes; some have suggested that periodontal disease may itself be a risk factor for progression of CKD. Patients with CKD who also have periodontal disease have been shown to have increased mortality compared to those who do not.² Despite the established benefits of regular preventative dental care, this may not be readily accessible, particularly for patients attending hemodialysis sessions 3 times a week.

We evaluated a program of on-dialysis dental screening to objectively determine the prevalence of periodontal disease in our hemodialysis patients. Patients attending daytime sessions at 7 in-center hemodialysis units across 4 separate hospital sites were invited to participate; those giving consent completed an oral health questionnaire and underwent a focused periodontal examination carried out during the dialysis session by 3 qualified dentists who had previously calibrated examination techniques, using an adjustable overhead lights and disposable dental kits. An adaptation of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and

Conditions³ was created, to allow a confident periodontal diagnosis to be made on the basis of examination findings alone, in the absence of radiographic data.

RESULTS

A total of 127 patients consented to be included in the study, and a periodontal diagnosis was made in 118 of these (7 were entirely edentulous and 2 did not tolerate the full examination). Characteristics of the patients are included in [Supplementary Table S1](#). Only 15 patients (12.7%) had an entirely healthy periodontium; a further 21 (17.8%) had evidence only of gingivitis. All the rest (69.5%) had periodontitis, with 59 (50%) having moderate or severe disease ([Figure 1a](#), [Supplementary Table S2](#)). Almost half (49.6%) of all patients reported active dental symptoms at the time of examination; this did not associate closely with periodontal diagnosis and 54% of those with periodontal disease were asymptomatic.

Multivariate ordinal regression identified 3 patient factors associated with increased disease severity as follows: age (odds ratio [OR] 0.456 on a 5-point disease severity score, 95% confidence interval 0.118–0.734, $P = 0.007$), non-White ethnicity (OR 1.51, 0.319–2.701, $P = 0.013$, [Figure 1b](#)) and smoking status (OR for never having smoked -1.093 , -1.885 to -0.3 , $P = 0.007$). Patients with gingivitis or healthy gums had a mean age of 54 years versus 63 years in those with periodontitis ($P = 0.004$). There was a trend toward higher disease scores in those with a greater duration of renal replacement therapy (OR 0.04,

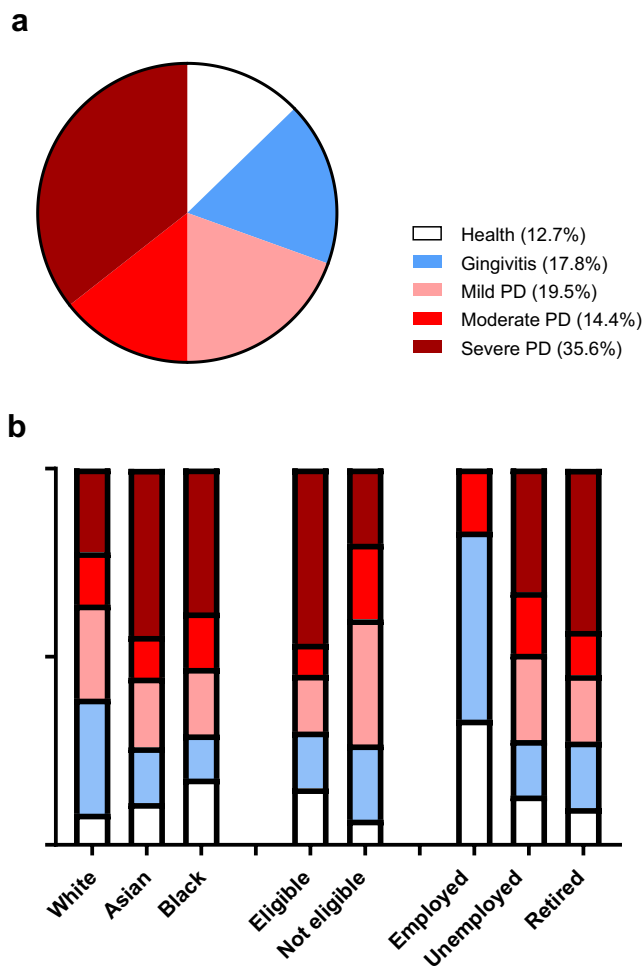


Figure 1. Prevalence of periodontal disease in patients receiving hemodialysis. (a) Periodontal status in the whole study population. (b) Periodontal status according to ethnicity, eligibility for free dental care and employment status.

0.0–0.09, $P = 0.068$), and in those living in more deprived areas based on the index of multiple deprivation (OR 0.15, 0.043–0.342, $P = 0.127$). Compared to patients with gingival health or gingivitis, there was a trend for those with severe periodontitis to weigh less (mean body weight 69.1 kg vs. 76.6 kg, $P = 0.087$), have lower body mass index (25.2 vs. 27.3, $P = 0.192$) and have higher rates of diabetes (60% vs. 41.6%, $P = 0.093$). Diabetic patients with periodontitis had higher Hemoglobin A1C than those without (mean 43.9 mmol/mol in healthy patients vs. 55.6 in those with periodontitis, $P = 0.007$).

We did not observe associations between periodontal disease and a range of biochemical parameters including serum albumin, C-reactive protein, and parathyroid protein.

Almost all patients (97.5%) reported brushing their teeth at least once daily, with two-thirds (65%) brushing twice daily. Although 69.9% of patients were registered with a dentist, only 38.6% attended for regular review (Table 1). Of the 78 patients not

attending for regular dental review, 41% could not identify a particular reason for this. Among those identifying a reason, lack of time to attend appointments was the leading barrier to accessing care (37.8%), followed by fear of dentists (17.9%), access problems caused by the COVID-19 pandemic (13.3%) and mobility issues (8.9%). Only 6.7% identified financial problems as a barrier to care. Among the patients, 82.7% indicated that they would welcome a dental service set up specifically for dialysis patients.

Although not statistically significant, we found that only 36.3% of patients living in more deprived areas (index of multiple deprivation 1–4) attended the dentist regularly compared with 44.4% of patients living in less deprived areas. Nonsignificant ethnic differences also emerged with 42.5% of White patients attending the dentist regularly compared with 40.7% of Asians, 35.1% of Black patients and 34.8% of those from other ethnicities.

DISCUSSION

As far as we are aware, this is the first study to evaluate a dental screening program comprising dental examinations performed while patients are receiving hemodialysis. The system we devised for classifying periodontal disease, though not previously validated, allows a confident (although limited) severity assessment based on international guidelines (as set out fully in the supporting documents) during a bedside dental examination, limiting the number of visits patients need to make to health care facilities.

We have demonstrated a very high prevalence of periodontal disease among patients receiving hemodialysis, similar to those reported previously, and highest in patients who were older, current or former smokers, non-White and diabetic.^{3–7}

There is good evidence in the general population that nonsurgical periodontal therapy, involving scaling and root planing, reduces the severity of periodontal disease.⁸ In the CKD population, randomized controlled trials have highlighted similar benefits including an improvement in disease scores and a reduction in systemic inflammation.⁹ Our results suggest that patients receiving hemodialysis may be denied this treatment because so few, especially in disadvantaged groups, attend the dentist regularly. The requirement for 3 times weekly hospital attendance, along with travel and recovery times, represents a considerable burden for many patients receiving hemodialysis, meaning that it is unsurprising that lack of time is the most commonly-cited reason why patients do not undergo regular dental review. The inability of many patients to give a reason for their lack of engagement with dental

Table 1. Access to dental care in the study population

Question	Response	Number (percent)
Does the patient have a registered dentist?	Yes	85 (66.9%)
	No	42 (33.1%)
Are they eligible for free dental care?	Yes	81 (63.8%)
	No	30 (23.6%)
	Unsure	16 (12.6%)
How frequently do they attend for dental review?	Regularly	49 (38.6%)
	Irregularly	78 (61.4%)
If they attend irregularly, why is this?	No reason identified	32 (41.6%)
	Lack of time	17 (22.1%)
	Fear of dentists	8 (10.4%)
	Effects of COVID pandemic	6 (7.8%)
	Poor mobility	4 (5.2%)
	Financial concerns	3 (3.9%)
Has the patient been previously diagnosed with periodontal disease?	Yes	42 (33.1%)
	No	84 (66.1%)
	Unsure	1 (0.8%)
Has the patient previous undergone professional dental cleaning?	Yes	93 (73.2%)
	No	34 (26.8%)
How frequently do they brush their teeth?	Twice or more per d	78 (65%)
	Once per d	39 (32.5%)
	Wkly	2 (1.7%)
	Less than wkly	1 (0.8%)
Do they perform interdental cleaning?	Daily	7 (5.8%)
	Occasionally	31 (25.8%)
	Never	82 (68.3)
Do they use mouthwash?	Daily	49 (38.6%)
	Occasionally	25 (19.7%)
	Never	53 (41.7%)
Would they be interested in a dedicated dental service for dialysis patients?	Yes	105 (82.7%)
	No	22 (17.3%)
If interested, what kind of service would they prefer?	Dental review and treatment whilst on dialysis	53 (51%)
	Dental review and treatment before or after dialysis sessions	41 (39.4%)
	Dental review on dialysis with subsequent treatment referral to community dentist	10 (9.6%)

care may imply that they are unaware of its relevance to their clinical condition, highlighting the need for clinicians to take a proactive approach in addressing their oral health.

This was a cross-sectional observational study carried out in a single dialysis program in the east of London which contains a diverse population and includes areas of considerable socioeconomic deprivation. It was carried out during the COVID-19 pandemic at a time when many routine health care services were severely disrupted. We surveyed only patients attending for day time dialysis slots as opposed to those in evening slots; therefore, our results may preferentially represent the frailer parts of our total patient population. Furthermore, we are based in the UK where free dental treatment is available via the National Health Service for many on low incomes. Each of these factors may limit the generalizability of our findings in other contexts, and suggest the need for further, larger, multicenter trials.

Notwithstanding this, there is accumulating evidence that CKD itself is a risk factor for periodontal disease, meaning that regardless of demographics, a high prevalence may be expected among patients receiving hemodialysis. We suggest that periodontal disease may be an overlooked health care need of these patients, and that as clinical services are being rebuilt

after the pandemic, a dedicated dialysis dental service might be a way to address health care inequalities and reduce barriers to care.

DISCLOSURE

All the authors declared no competing interests.

SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

Supplementary Methods.

Supplementary References.

Oral health questionnaire.

Proforma for bedside dental examination.

Information acquired from patient's electronic health care record.

Method used to adapt the 2017 classification of periodontal diseases to reach a diagnosis in CKD patients based on a limited bedside periodontal examination.

Table S1. Demographics of the patient cohort.

Table S2. Prevalence of periodontal disease in the study cohort.

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