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Increased periodontal pathology in Parkinson's disease

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■ **Abstract** Parkinson's disease is characterized by rigidity, akinesia and tremor, all of which interfere with automated small hand movements potentially affecting oral care. In addition, medication and craving for sweets are other risk factors for dental and periodontal disease in these patients. Here, we report the Community Periodontal Index for Treatment Needs (CPITN) data in 70 patients with Parkinson's disease and 85 age-matched control subjects. CPITN indices were assessed in all 6 sextants. Mean CPITN indices of control subjects ranged from 1.6 ± 0.2 in the upper frontal sextant to 2.5 ± 0.2 in the upper left lateral sextant. 17.9% of controls showed severely affected teeth (CPITN code 4) in the upper left or upper right sextant, while there were no teeth at risk in the upper frontal sextant. Patients suffering from

Parkinson's disease, however, had a markedly increased mean CPITN index in the upper frontal sextant (2.4 ± 0.2) with 11.5 patients having severely affected teeth (CPITN code 4). CPITN indices in all other sextants were less severely increased. Overall, there was a significant difference between mean CPITN indices of patients and controls ($p < 0.05$). It seems also noteworthy that female controls had lower CPITN indices in all sextants compared with male controls. This gender difference, however, was reversed in Parkinson's patients. We believe that problems in oral hygiene contribute to this increased periodontal pathology in patients with Parkinson's disease, which may further compromise the quality of life.

■ **Key words** Parkinson's disease · periodontal status · CPITN

Introduction

Fine hand movements impairment is one of the characteristics of Parkinson's disease (PD) [4, 5]. Their computerized analysis can aid in the early diagnosis and quantitative assessment of treatment effects [5]. Oral hygiene depends on such automated hand movements and difficulties in performing oral hygiene are amongst the early signs of this disorder. However, motor impairment may not represent the only factor putting patients suffering from PD at a special risk for oral pathology. Some

patients suffering from PD crave for sweets leading to increased consumption of foodstuffs rich in sugar which may affect the oral microflora [10]. Furthermore, difficulties in swallowing and hypersalivation may further affect the oral environment [13, 17]. Also, the effects of antiparkinsonian drugs on oral microflora are not known. Therefore, patients with PD seem to be at a special risk in respect to oral pathology. Surprisingly, there have been very few reports on dental examinations in these patients. There are no special programs addressing preventive issues. When it comes to treatment involving dental replacement, there have been few case re-

ports about the successful use of implants in patients with PD [3, 7, 8, 11]. These are contrasted by a potential increase in morbidity following implantation secondary to the limitations indicated above.

Quality of life is markedly reduced in patients with PD. It is increasingly recognized that not only motor symptoms but also neuropsychological effects account for this reduction [12, 15, 18, 19]. Dental health also seems to have a substantial impact on the quality of life in the general population [16]. The impact of oral health on the quality of life in patients with PD has not been considered. Therefore, we wanted to gather standardized data on periodontal pathology in patients with PD using a well defined and easy to use rating scale, the Community Periodontal Index for Treatment Needs (CPITN) developed and validated by the World Health Organization. This scale was employed in cross sectional investigation of 70 patients who were screened by their regular dentist and 85 age matched controls who sought routine dental counselling.

Patients and methods

70 patients suffering from PD were asked to have their periodontal status examined during the next scheduled visit to their dentist. Patients were contacted via our outpatient clinic and via the "Deutsche Parkinson Vereinigung" (dPV). In addition, 85 age-matched controls were included who were randomly recruited among patients seeking routine dental examinations in the outpatient office of one of the investigators (E. H.). None of the patients nor any of the control subjects were asked to seek dental care only for evaluation of their periodontal status. The mean age of patients was 64.5 years (range 48–75) and of control subjects 62 years (50–78). Among patients, there were 31 (44%) females and 39 males while among control subjects there were 44 (51.7%) females and 41 males. The diagnosis of PD had to rely on the diagnosis of the treating physician. Unfortunately, no clinical data in respect of clinical symptomatology, disease duration, levodopa response, etc. were available for patients not seen in our hospital ($n = 46$). Patients seen at our hospital all fulfilled respective clinical criteria [9].

The CPITN (Community Periodontal Index of Treatment Needs) was used to assess periodontal conditions using a Periodontal Screening and Recording (PSR™) probe. The tip of this probe is equipped with a small (0.5 mm diameter) ball. Relevant distances (3.5 and 5.5) mm are highlighted on the probe. Only the most pathological value per sextant was documented. The five frontal teeth represent sextants II (upper teeth) and V (lower teeth), while sextants I, III, IV and VI include the lateral teeth which vary in number. Scores were analyzed and displayed for each sextant separately. Scores were based on WHO criteria and registered as follows: 0 = healthy, no calculus, no bleeding; 1 = bleeding observed, directly or by using mouth mirror, after probing; 2 = calculus detected during probing, but all the black band on the probe visible; 3 = pocket 4–5 mm (gingival margin within the black band on the probe), 4 = pocket 6 mm or more (black band on the probe not visible). Code 4 rated teeth were considered severely affected requiring intensive treatment.

Results

CPITN indices of control subjects were well in the range of large community based evaluations [1]. Ahrens and

Bublitz reported that 15% of the population were rated as CPITN code 4 indicating urgent need for therapy for periodontal pathology. In our control group the respective values ranged between 17.9% (lateral sextants) and 0% (upper frontal sextant; Fig. 1A). Mean CPITN indices measured as 1.6 in the frontal sextants and up to 2.4 in the lateral sextants were also well in the range of this large German investigation. In addition, gender differences with female subjects showing less pronounced periodontal disease also was previously reported [1].

Combining the CPITN score of all six teeth (1 per sextant), there was a significant difference between patients and controls (2.5 ± 0.1 versus 2.1 ± 0.1 , mean \pm SEM, $p < 0.01$, t-test; Fig. 1B). Differences were most pronounced in respect to upper frontal teeth (2.3 ± 0.01 versus 1.6 ± 0.1 , $p < 0.0001$, t-test) while there were no differences in respect of lateral right upper teeth (2.6 ± 0.1 versus 2.6 ± 0.1). Gender analysis of patients showed that the difference seen in controls was reversed in patients with PD. Female patients showed a trend towards higher CPITN indices compared with male patients (Fig. 1C). These differences, again, were most pronounced within the upper frontal sextant but not significant. In contrast, female controls had a trend towards less parodontal pathology (Fig. 1D).

Discussion

Although patients with Parkinson's disease (PD) carry several risk factors for dental and periodontal pathology, little is known about their actual oral status or dental treatment requirements. However, the increasing prevalence of neurodegenerative disorders in our ageing society will also necessitate focusing on the special needs of these patients. Previous epidemiological investigations with Parkinson's disease patients have remained controversial.

A recent case control study in Japan showed that patients with PD have fewer teeth and also did not clean their dentures as regularly as controls [14]. Accordingly, severe dental problems were reported in all participants of a Greek survey [2]. On the other hand, in a small group of Parkinson's disease outpatients, patients had more teeth compared with controls [6]. Kennedy and co-workers investigated dental plaques in 14 patients and 14 controls. Although there were only minor differences in oral microflora, Parkinson's disease patients showed significantly more pronounced mucositis [10]. However, there were no differences in the number of remaining teeth.

Better periodontal status in control females was mostly attributed to oral hygiene in the general population. It remains unclear, why female Parkinson's disease patients are at a greater risk of developing periodontal pathology. The results of this study showed that there were significant differences between male and female

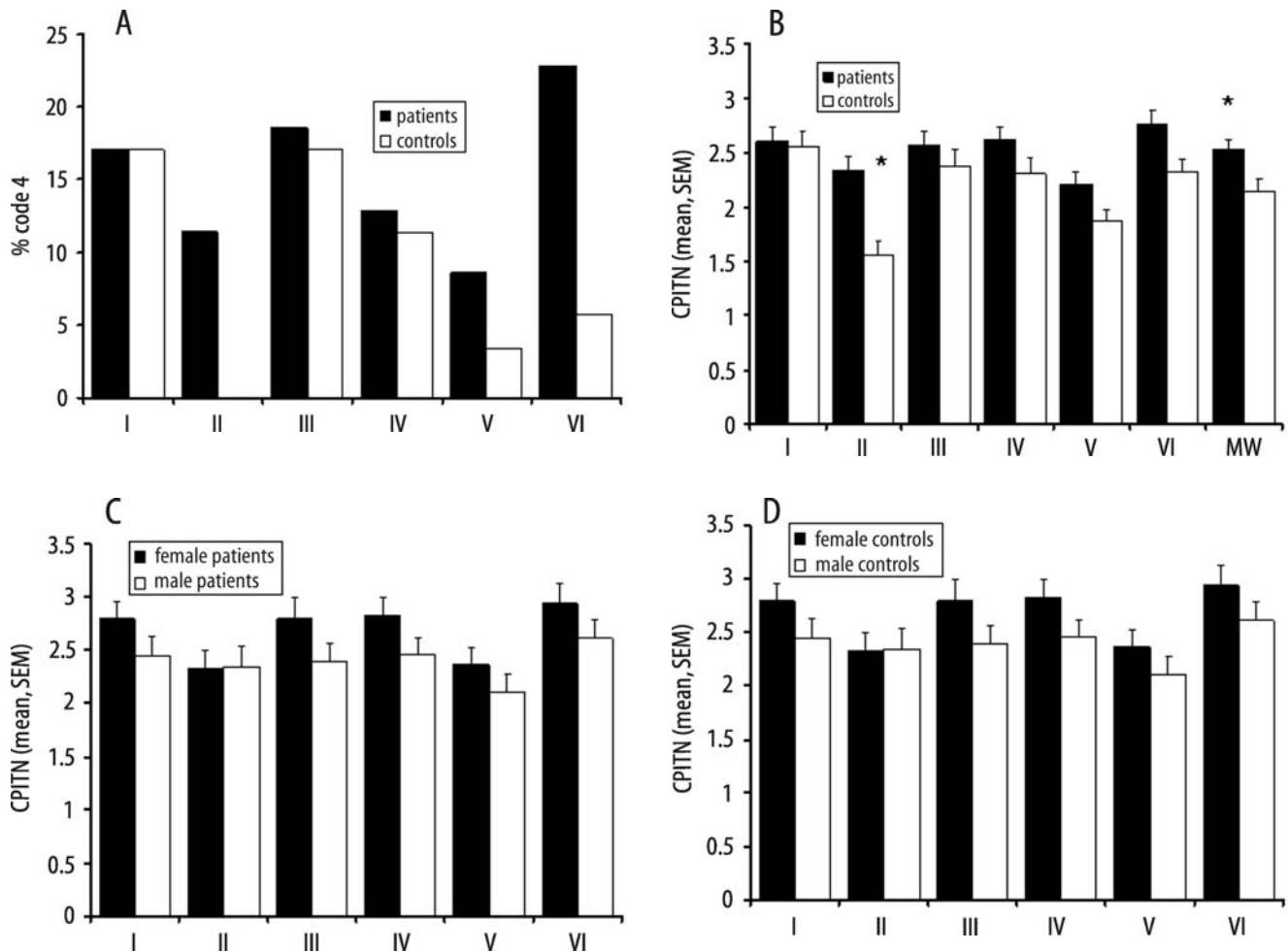


Fig. 1 CPITN values of patients and controls. **Panel A** displays the percentage per sextant of severely affected teeth (code 4) in each sextant. **Panel B** indicates the mean CPITN values of patients and controls for all sextants. Note that there is worsening of the periodontal status in patients most pronounced in the second sextant. **Panel C and D** highlight the inverse gender differences when comparing patients and controls

PD patients ($p < 0.01$) and that female PD patients found to be at greater risk of developing periodontal pathology but because the sample used in this study consisted of 70 participants and the participants consisted of more males than females this finding needs to be confirmed by further studies. Furthermore, future studies should be performed and relate periodontal status and number of teeth present to the status of the disease progression and evaluation of neuromuscular symptoms and PD patients' withdrawal as well as to gender and disease duration.

Our data provide novel evidence for limitations of dental care in PD patients. Although this finding is not at all surprising it remains nevertheless important to patients, caregivers and therapists. The fact that teeth were differentially affected may point towards the impairment of motor skills being the primary risk factor. We hope that future studies will aim to provide special preventive measures to preserve the periodontal status in this group of patients.

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