

**COMPARATIVE CPI ASSESSMENT OF PERIODONTAL DISEASE INTENSITY IN
PARTIALLY EDENTULOUS PATIENTS ACROSS STUDY GROUPS**

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Abstract. This study assessed the intensity of periodontal disease in patients requiring orthopedic rehabilitation using the CPI (Community Periodontal Index). Only individuals with partially preserved teeth were included, because CPI evaluation is feasible only in sextants where teeth are present; completely edentulous patients were excluded from periodontal assessment. Group distribution was as follows: Group 1 — 62 patients (40.0%), Group 2 — 54 (34.8%), and Group 3 — 39 (25.2%). No cases of clinically healthy periodontal tissues were identified. Across groups, 4–5 mm periodontal pockets represented the most frequent clinical finding, while deep pockets (≥ 6 mm) were relatively more common in Groups 2 and 3, suggesting a higher proportion of severe periodontal involvement. Gender-based differences were generally minimal and mostly not statistically significant ($t < 2$). The findings indicate the need for strengthened prevention, routine periodontal monitoring, and individualized planning of orthopedic rehabilitation in older adults.

Keywords: periodontal disease, CPI index, bleeding on probing, dental calculus, periodontal pocket, edentulous sextant, orthopedic rehabilitation.

Introduction. Periodontal diseases (gingivitis and periodontitis) represent one of the major oral health problems among older adults, increasing the risk of tooth mobility, formation of deep periodontal pockets, and tooth loss (Petersen, Ogawa, 2005). Epidemiological data indicate that the prevalence of periodontitis rises with age, and the severity of periodontal tissue destruction is closely associated with health-related risk factors and oral hygiene status (Eke et al., 2015).

In patients requiring prosthetic rehabilitation, in addition to partial or complete dental arch defects, the periodontal tissue condition also determines treatment tactics and prognosis. In particular, objective assessment of periodontal disease intensity in partially dentate patients is essential for selecting an appropriate prosthetic design, individualizing hygiene recommendations, and planning follow-up monitoring (Petersen, Ogawa, 2005).

For standardized assessment of periodontal disease severity, the Community Periodontal Index (CPI) recommended by the World Health Organization is widely used. CPI enables population monitoring and clinical screening based on sextant-level evaluation of bleeding on probing, calculus (and other plaque-retentive factors), and periodontal pockets (WHO, 2013). This approach was initially developed as CPITN to unify periodontal assessment at the population level (Ainamo et al., 1982). Later studies emphasized the screening nature of CPITN/CPI, allowing rapid assessment based on the presence/absence of bleeding, calculus, and pockets (Cutress et al., 1987).

However, since CPI is performed only in sextants with teeth present, it cannot fully reflect periodontal status in completely edentulous patients. Therefore, such sextants should be recorded as “edentulous/excluded” and considered separately in analysis (WHO, 2013). In the present study, periodontal disease intensity was assessed only in partially dentate patients, while complete edentulism cases were excluded, ensuring methodological validity and comparability (WHO, 2013).

Aim of the Study. To assess periodontal disease intensity in partially dentate patients requiring prosthetic rehabilitation using the CPI (Community Periodontal Index), and to perform a comparative analysis of periodontal clinical status across study groups and by sex. Additionally, the study aimed to determine the distribution of key clinical indicators of periodontal damage—

bleeding, calculus, 4–5 mm pockets, ≥ 6 mm pockets, and the proportion of excluded (edentulous) sextants—thereby evaluating the role of periodontal status in prosthetic treatment planning (Petersen, Ogawa, 2005; WHO, 2013).

Materials and Methods. This clinical observational study included patients requiring prosthetic dental care. Only patients with partial tooth loss were enrolled. Completely edentulous patients were excluded because CPI-based assessment is not applicable in the absence of teeth (WHO, 2013).

Patients were divided into three groups based on social/living conditions: Group 1 — residents of the “Muruvvat” care home;

Group 2 — patients living under the care of their children;

Group 3 — patients living alone.

Periodontal status was assessed using the WHO-recommended CPI. In six oral sextants, the following indicators were recorded:

— bleeding on probing;

— calculus or other plaque-retentive factors;

— periodontal pockets 4–5 mm;

— periodontal pockets ≥ 6 mm;

— sextants with only one tooth present or completely edentulous (Ainamo et al., 1982; Cutress et al., 1987).

Sextants with only one tooth or no teeth were excluded from CPI scoring and recorded separately as “excluded sextants,” ensuring standardized and comparable results (WHO, 2013).

Data were analyzed by groups and sex. For each clinical sign, the mean number of sextants ($M \pm m$) and corresponding percentage were calculated. Student’s t-test was used; differences were considered statistically significant at $t > 2$ (Glantz, 1999).

Results. The study included patients with partial and complete tooth loss; however, CPI-based periodontal assessment could only be performed in partially dentate patients. Therefore, completely edentulous individuals were excluded from this analysis. In older age categories, periodontal evaluation was based only on patients with remaining teeth (Table 3.5).

Table 3.5

Distribution of partially dentate patients by study groups (n, %)

Group	Men (n, %)	Women (n, %)	Total (n, %)
Group 1	30 (19.4%)	32 (20.6%)	62 (40.0%)
Group 2	26 (16.8%)	28 (18.1%)	54 (34.8%)
Group 3	21 (13.5%)	18 (11.6%)	39 (25.2%)

In this study, CPI was used to assess periodontal disease intensity. CPI allows sextant-level evaluation of periodontal tissues based on bleeding, calculus, and periodontal pocket depth. Notably, no cases with completely healthy periodontal tissues were identified among the included patients.

To examine periodontal disease intensity in greater detail, separate within-group analyses were performed. Sextants with only one tooth or no teeth were excluded from CPI scoring and recorded separately. Relevant data are presented in Tables 3.6–3.15 and Figures 3.7–3.10. Sex-specific analysis was also carried out within each group.

Table 3.6

Quantitative CPI indicators in Group 1 ($M \pm m$)

CPI criteria	Men	Women	Differences (t; P)
Healthy tissue	–	–	–
Bleeding	0.17 ± 0.07	0.09 ± 0.05	$t = 0.9$; $P < 95.5\%$
Calculus	1.27 ± 0.21	1.25 ± 0.17	$t = 0.1$; $P < 95.5\%$

4–5 mm pockets	1.90 ± 0.24	2.50 ± 0.22	t = 1.9; P < 95.5%
≥6 mm pockets	0.47 ± 0.72	0.56 ± 0.13	t = 0.5; P < 95.5%
Excluded sextants (1 tooth/no teeth)	2.20 ± 0.26	1.59 ± 0.25	t = 1.7; P < 95.5%

In Group 1, the mean number of sextants with bleeding was 0.17 ± 0.07 in men and 0.09 ± 0.05 in women. Sextants with calculus were 1.27 ± 0.21 in men and 1.25 ± 0.17 in women. The most frequently recorded sign was 4–5 mm periodontal pockets (men: 1.90 ± 0.24; women: 2.50 ± 0.22). Sextants with ≥6 mm pockets were 0.47 ± 0.72 in men and 0.56 ± 0.13 in women. Excluded sextants were higher in men (2.20 ± 0.26) than in women (1.59 ± 0.25). Overall, no statistically significant sex differences were observed (t < 2).

Table 3.7

Frequency of periodontal clinical signs in Group 1 (%)

Clinical signs (CPI)	Men	Women
Healthy tissue	0.0	0.0
Bleeding	2.7	1.6
Calculus	21.1	20.8
4–5 mm pockets	31.7	41.6
≥6 mm pockets	7.8	9.4
Excluded sextants	36.7	26.6

Among men in Group 1, excluded sextants accounted for 36.7%, and 4–5 mm pockets for 31.7%; ≥6 mm pockets were observed in 7.8%. Calculus was recorded in 21.1% of sextants, while bleeding was relatively rare (2.7%). In women, 4–5 mm pockets were more frequent (41.6%), excluded sextants constituted 26.6%, and ≥6 mm pockets were 9.4%. Bleeding was less frequent (1.6%), while calculus prevalence was similar (20.8%).

Table 3.8

Quantitative CPI indicators in Group 2 (M ± m)

CPI criteria	Men	Women	Differences (t; P)
Healthy tissue	–	–	–
Bleeding	0.19 ± 0.08	0.18 ± 0.07	t = 0.1; P < 95.5%
Calculus	1.19 ± 0.22	1.32 ± 0.28	t = 0.4; P < 95.5%
4–5 mm pockets	2.27 ± 0.30	2.29 ± 0.30	t = 0.0; P < 95.5%
≥6 mm pockets	0.81 ± 0.26	0.68 ± 0.17	t = 0.4; P < 95.5%
Excluded sextants	1.54 ± 0.27	1.54 ± 0.29	t = 0.0; P < 95.5%

In Group 2, mean values were very close between sexes, and no statistically significant differences were found (t < 2).

Table 3.9

Frequency of periodontal clinical signs in Group 2 (%)

Clinical signs (CPI)	Men	Women
Healthy tissue	0.0	0.0
Bleeding	3.2	3.0
Calculus	19.9	22.0
4–5 mm pockets	37.8	38.1
≥6 mm pockets	13.5	11.3
Excluded sextants	25.6	25.6

The most common clinical sign was 4–5 mm pockets (37.8% in men; 38.1% in women). ≥6 mm pockets were observed in 13.5% of sextants in men and 11.3% in women. Excluded sextants were identical in both sexes (25.6%). Bleeding was the least frequent sign.

Table 3.10

Quantitative CPI indicators in Group 3 (M ± m)

CPI criteria	Men	Women	Differences (t; P)
Healthy tissue	–	–	–
Bleeding	0.14 ± 0.08	0.28 ± 0.14	t = 0.9; P < 95.5%
Calculus	1.38 ± 0.22	1.11 ± 0.24	t = 0.4; P < 95.5%
4–5 mm pockets	1.81 ± 0.30	1.83 ± 0.29	t = 0.0; P < 95.5%
≥6 mm pockets	0.86 ± 0.26	0.56 ± 0.15	t = 0.9; P < 95.5%
Excluded sextants	1.81 ± 0.27	2.22 ± 0.28	t = 1.0; P < 95.5%

In Group 3, the highest values were observed for excluded sextants, particularly in women (2.22 ± 0.28). Nevertheless, no statistically significant sex differences were found (t < 2).

Table 3.12

CPI quantitative indicators across three groups (M ± m)

Indicator	Group 1	Group 2	Group 3
Healthy tissue	–	–	–
Bleeding	0.13 ± 0.04	0.19 ± 0.05	0.21 ± 0.08
Calculus	1.26 ± 0.13	1.26 ± 0.18	1.26 ± 0.19
4–5 mm pockets	2.21 ± 0.17	2.28 ± 0.21	1.82 ± 0.20
≥6 mm pockets	0.52 ± 0.10	0.74 ± 0.15	0.72 ± 0.16
Excluded sextants	1.89 ± 0.18	1.54 ± 0.20	2.00 ± 0.21

Across groups, the mean number of sextants with calculus was almost identical (1.26) in all three groups. Bleeding was highest in Group 3 (0.21 ± 0.08) and lowest in Group 1 (0.13 ± 0.04). Sextants with 4–5 mm pockets were similar in Groups 1 and 2 (2.21 ± 0.17 and 2.28 ± 0.21) but lower in Group 3 (1.82 ± 0.20). Sextants with ≥6 mm pockets were higher in Groups 2 and 3 compared with Group 1. Excluded sextants were most frequent in Group 3 and least frequent in Group 2. Although mean differences were observed, many comparisons did not reach statistical significance.

Table 3.13

Distribution of periodontal clinical signs across three groups (%)

Clinical signs (CPI)	Group 1	Group 2	Group 3
Healthy tissue	0.0	0.0	0.0
Bleeding	2.2	3.1	3.4
Calculus	21.0	21.0	20.9
4–5 mm pockets	36.8	38.0	30.3
≥6 mm pockets	8.6	12.3	12.0
Excluded sextants	31.4	25.6	33.4

Overall, periodontal clinical signs were present in all three groups, but their distribution and severity differed. Groups 1 and 2 showed broadly similar patterns, with 4–5 mm pockets being the most prevalent sign (36.8% and 38.0%), while excluded sextants ranked second (31.4% and 25.6%). The proportion of sextants with ≥6 mm pockets was higher in Group 2 (12.3%) than in Group 1 (8.6%). Bleeding was relatively infrequent in both groups.

In Group 3, excluded sextants were recorded more frequently (33.4%), indicating a greater extent of tooth loss. The share of 4–5 mm pockets was 30.3%, while ≥6 mm pockets accounted for 12.0%. Bleeding was slightly more frequent in Group 3 (3.4%) compared with Groups 1 and 2.

Conclusion. Based on CPI and the distribution of clinical signs, periodontal involvement was observed across all groups, with variations linked to living conditions. Group 1 demonstrated comparatively milder periodontal findings and lower bleeding scores. Group 2

exhibited a higher proportion of deep periodontal pockets (≥ 6 mm), suggesting more severe periodontal damage, while also showing the lowest number of excluded sextants (i.e., less tooth loss). Group 3 showed the highest tooth loss burden (greater proportion of excluded sextants), alongside higher bleeding and deep-pocket indicators in certain subgroups. These findings underscore the importance of incorporating periodontal status into prosthetic treatment planning and tailoring preventive and follow-up strategies to patients' social context.

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