Comparison of Partial- and Full-Mouth Examination in Periodontal Assessment Among Untreated Patients

R. ShariatmadarAhmadi 1, MJ.Kharazi Fard 2, V. Mousavi 3

1Assistant Professor, Department of Periodontics, School of Dentistry, Islamic Azad University of Medical Sciences, Tehran, Iran
2Statistical Consultant, Dental Research Center, Tehran University of Medical Sciences, Tehran, Iran
3Dentist, Private Practice

Abstract:
Objective: Whole-mouth examination is generally considered as a gold standard for exact periodontal disease assessment. Partial mouth examination also has sometimes been used for this purpose, but its efficacy has been questioned. With regard to symmetric destruction hypothesis of periodontal disease, the present study investigated the efficacy of partial-mouth examination as an alternative for whole-mouth examination.

Materials and Methods: Eighty subjects aged between 20 to 61 years old (mean 41 years old, 47 males & 33 females) with periodontal disease at different stages of severity and extent (Mild, Moderate, Severe) were examined. Plaque index (PI), gingival index (GI), and papillary bleeding index (PBI) were assessed in whole-mouth except third molars, and were compared with four defined partial-mouth examinations on teeth in Upper Right/Lower Left, Upper Right/Lower Right, and Upper Left/Lower Left quadrants, as well as on Ramfjord teeth. T-test and intraclass correlation coefficients (ICC) served for statistical analysis.

Results: Differences between mean PI, GI, PBI in partial and whole-mouth examination were not statistically significant (P>0.05) and agreement between partial- and whole-mouth assessment was generally greater than 0.9 (ICC>0.9). However, upper right and lower left quadrants examinations showed the most consistency and conformity with whole-mouth examination.

Conclusion: partial-mouth examination procedure especially in upper right and lower left quadrants might be considered as an acceptable alternative to whole mouth assessment. Partial-mouth examination procedure conserves time, limit cost and reduce the patient and examiner’s fatigue while providing maximum clinical information.

Key Words: Periodontal Diseases; Periodontal Index; Gingival Diseases

INTRODUCTION
In epidemiological investigations, a proper assessment of disease is very important for understanding the disease progression and treatment needs [1,2]. In assessment of periodontal disease, full–mouth examination, is considered as the most appropriate assessment protocol, or "gold standard" [3,4]. Full–mouth examination consists of examination of six sites per tooth on all existing teeth [4]. This method of examination, however, can be fatigued to both examiner and subject, time-consuming, and expensive [2]. Moreover, it may lead to participation of only a few subjects and the power of the study would be declined dramatically [2]. Thus, a partial-mouth assessment is used to diminish these practical matters. However,
some concerns exist over accuracy of such examinations for assessment of the level of disease [4]. It seems that periodontal disease is both site- and tooth-specific [5-9], and thus it is unlikely that examination of limited teeth or sites will provide an accurate assessment of disease severity [2]. On the other hand, periodontal destruction seems to display a left-right symmetry [6-9], and therefore, assessment of one upper and one lower quadrants can provide an appropriate substitute for full-mouth examination [2].

Partial-mouth assessment often consists of examination of index teeth, such as the Ramfjord teeth. The Ramfjord index teeth comprise maxillary left and mandibular right central incisors, maxillary left and mandibular right first premolars, and maxillary right and mandibular left first molars (teeth #3, 9, 12, 25, and 28) [1,2]. Also, in the Third National Health and Nutrition Examination Survey (NHANES III) study in USA, only limited sites per tooth including mesio-buccal and mid-buccal sites were examined [5].

The present study was designed to evaluate the efficacy of partial-mouth examination as a substitute for full-mouth examination.

**MATERIALS AND METHODS**

In this diagnostic study, eighty patients (33 females and 47 males) ranging in age from 20 to 61 years (mean age 41 years) and with gingivitis and chronic periodontitis at different stages of severity (mild, moderate and severe) were recruited among those seeking care at the Dental School of Islamic Azad University. The inclusion criteria were age ≥18 years and having at least 20 existing teeth (except third molars).

As whole-mouth examination (gold standard), for each patient the following indices were assessed and recorded for all teeth (except third molars): Turesky-Gilmore-Glickman modification of the Quigly-Hien plaque index (PI) [10], Loe and Silness gingival index (GI) [11], and Muhlemann papillary bleeding index (PBI) [12]. These indices in the following sections and teeth were considered as four separate partial-mouth examinations: the upper right and lower left quadrants (UR/LL), the upper right and lower right quadrants (UR/LR), the upper left and lower left quadrants (UL/LL), and the Ramfjord teeth (teeth # 3, 9, 12, 19, 25 and 28). All assessments were done by a single trained examiner. The time taken for this whole-mouth examination was also recorded.

The obtained data from whole-mouth examination (gold standard) were compared with partial-mouth assessment. The intraclass correlation coefficients (ICCs) were calculated to estimate the level of agreement between each partial-mouth and whole-mouth assessments.

Data were analyzed by means of SPSS 11.5 for Windows XP (Chicago, II).

**RESULTS**

Table 1 shows the means and standard deviations of three parameters. For mean PI and GI both two-quadrant assessments and the Ramfjord teeth assessment provided an acceptable alternative to whole-mouth assess-

<table>
<thead>
<tr>
<th>Index</th>
<th>Whole Mouth</th>
<th>Two-quadrant</th>
<th>Ramfjord teeth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>PI</td>
<td>3.58 ± 0.74</td>
<td>3.58 ± 0.74</td>
<td>3.65 ± 0.76</td>
</tr>
<tr>
<td>GI</td>
<td>1.63 ± 0.41</td>
<td>1.65 ± 0.41</td>
<td>1.65 ± 0.42</td>
</tr>
<tr>
<td>PBI</td>
<td>1.50 ± 0.44</td>
<td>1.58 ± 0.45</td>
<td>1.51 ± 0.48</td>
</tr>
</tbody>
</table>

*Upper right and lower left quadrants †Upper right and lower right quadrants ‡Upper left and lower left quadrants §Teeth # 3,9,12,19,25 and 28
ment with ICC ≥ 0.975. For PBI, although all the ICCs were more than 0.94, two-quadrant assessment had slightly more ICC than the Ramfjord teeth assessment. The UR/LL assessment had higher ICCs than the others in assessing PI, GI, and PBI (Table 2). Regarding the age, all the ICCs for PI, GI, and PBI were higher in older patients but these differences were not statistically significant (P≥0.05) (Table 2). The mean times for whole-mouth examination were four minutes.

**DISCUSSION**

In this diagnostic study, data from adult subjects with chronic periodontitis were used to determine whether assessment of PI, GI, and PBI in partial-mouth examinations could supply an acceptable alternative for full-mouth assessment of these indices. In the present study, the mean PI and GI in two-quadrant assessments and the Ramfjord index teeth assessment provided an acceptable substitute for full-mouth examination. The UR/LL assessments were superior to the other in assessing PI, GI, and PBI.

Previously, in order to compare partial- and full-mouth examinations, generally the non-parametric equivalents such as the Spearman's and Pearson's correlation coefficients have been used. However, these statistical tests only offer a measurement of an association between two variables and do not show the actual agreement. On the other hand, the ICC, used in the present investigation, has been designed to assess conformity or consistency between two or more variables [3].

The only available similar study by Dowsett et al [3] is in agreement with our findings. In that study ICCs were calculated for mean PI and mean GI and the results showed that both half-mouth and the Ramfjord index teeth assessment could provide a suitable alternative for full-mouth examination (ICCs ≥ 0.93) [3].

In the present study, the UR/LL assessment (diagonal) had higher ICCs than the other assessments for all the three measured indices. These results are in accordance with other studies [2,5-9] that found periodontal destruction tends to show left-right symmetrical distribution, and it seems that assessment of one upper and one lower quadrant would provide a suitable alternative to full-mouth assessment.

In the present investigation two age groups were defined (over and under 45 years old) and the results showed that ICCs for all the three measured indices were higher in older patients but no statistically significant differences existed (P>0.05). It seems that in spite of

| Table 2. Mean intraclass correlation coefficients of plaque index (PI), gingival index (GI), and papillary bleeding index (PBI) between partial-mouth assessment (two-quadrant and Ramfjord teeth assessments) and whole-mouth assessment in two defined age groups among 80 adult patients |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| Parameter       | Age  | UR/LL | Two-quadrant | UL/LL | Ramfjord teeth |
|                 |      |       | UR/LR |       |               |
| PI              | ≤ 45 | 0.986 | 0.969 | 0.967 | 0.985          |
|                 | > 45 | 0.991 | 0.982 | 0.984 | 0.980          |
|                 | All  | 0.988 | 0.975 | 0.975 | 0.983          |
| GI              | ≤ 45 | 0.985 | 0.983 | 0.982 | 0.969          |
|                 | > 45 | 0.997 | 0.993 | 0.993 | 0.992          |
|                 | All  | 0.992 | 0.989 | 0.989 | 0.983          |
| PBI             | ≤ 45 | 0.959 | 0.94  | 0.935 | 0.905          |
|                 | > 45 | 0.981 | 0.981 | 0.982 | 0.977          |
|                 | All  | 0.971 | 0.962 | 0.961 | 0.943          |

*Upper right and lower left quadrants † Upper right and lower right quadrants ‡ Upper left and lower left quadrants § Teeth # 3,9,12,19,25 and 28
Increasing prevalence and severity of periodontal disease with increasing age, correlation between full- and partial-mouth assessments is not age-related.

The aim of the present and previous similar studies [2-4,13-19] has been to determine whether or not partial-mouth examination could be used as an appropriate substitute for whole-mouth examination. Although these studies generally recognize partial-mouth examination as acceptable, answer to this question remains dependent to the aim of the assessment. In epidemiological studies assessing the relation between periodontal disease and a systemic or environmental risk, partial-mouth assessment seems to save cost and time and reduce the patient and examiner's fatigue considerably. In the current study, although the average time for whole-mouth assessment was not significant (only four minutes), assessing other parameters certainly needs more time. Therefore, in partial-mouth examination time will be saved in comparison with full-mouth examination. However, a longitudinal clinical trial focusing on site-specific changes in response to a given therapy would ordinarily necessitate whole-mouth examination of six sites per tooth.

CONCLUSION
In conclusion, based on the results of the present study, partial-mouth examination procedure especially in upper right and lower left quadrants might be considered as an acceptable alternative to whole mouth assessment.

ACKNOWLEDGMENTS
This study was supported by a grant from Islamic Azad University of Medical Sciences. The authors report no conflicts of interest related to this study.

REFERENCES
13-Hunt RJ. The efficiency of half-mouth examinations in estimating the prevalence of periodontal