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The plaque control index: A practical method of assessing the effectiveness of oral hygiene procedures

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SUMMARY

Several plaque indices have been reviewed, and whereas their value in epidemiological and clinical studies is inestimable, the detail required in examination and recording procedures makes them rather too time-consuming for everyday practice. Moreover, since with one exception, (O'Leary, 1972), they were not designed for this purpose, their value in assessing the effectiveness of the patient's oral hygiene efforts is limited. A new index, the ***plaque control index,*** *provides a quick and simple method of monitoring a patient's ability to control dento-gingival plaque: it provides a numerical score which reflects the overall state of oral hygiene from one visit to the next; it pinpoints the sextant or sextants, and even the particular surfaces where plaque removal is less than adequate, and thus relates directly to deficiencies in brushing and/or interproximal cleansing technique; it stresses the importance of the interproximal area; and it is easily understood by both patients and auxiliaries.*

OPSOMMING

Etlike plaakindekse is nagegaan en ondanks die feit dat hul van onskatbare waarde in epidemiologiese en kliniese studies is, is die verkryging van die gegewens (wat in die ondersoek en opname prosedures benodig is) te tydrowend om hulle in alledaagse praktyk te gebruik. Daarbenewens, behalwe in die geval van één, (O'Leary, 1972), is hulle nie vir hierdie doel geskep nie, en is hul waarde in die doeltreffendheidsbepaling van die pasiënt se pogings tot mondhigiëne, van beperkte waarde. 'n Nuwe indeks, die ***plaakkontrole indeks,*** *verskaf 'n vinnige en eenvoudige metode om 'n pasiënt se vermoë om dentogingivale plaak te kontroleur waar te neem. Hierdie indeks voorsien 'n numeriese puntetelling wat die algemene toestand van mondhigiëne van besoek tot besoek weergee. Dit stip die sekstant of sekstante aan asook die besondere oppervlakke waar plaakverwydering onvoldoende is, en dui dus gebrekkige borsel en/of interproksimale skoonmaaktegniek aan. Dit lê klem op die belangrikheid van die interproksimale area en word met gemak deur beide pasiënt en hulppersoneel verstaan.*

There is a need for an oral hygiene index which would serve not only as a clinical record of oral hygiene status in numerical form, but also as a useful guide to the effectiveness of the patient's oral hygiene efforts.

Many oral hygiene indices have been devised. Most of these were developed primarily for epidemiological studies, and were instrumental in relating the presence and quantity of dento-gingival plaque to periodontal disease. The scoring systems used depend upon measurement of the amount of dento-gingival plaque present either on all the teeth, or on selected groups of teeth, or on selected individual teeth. Many of these plaque scoring indices have been adopted for use in clinical practice.

This paper has two purposes: firstly, to review some of the indices currently in use, with particular regard to their application and value in monitoring an individual's performance in plaque control: and secondly, to present a new index which is named the *plaque control index.*

REVIEW OF SOME PLAQUE INDICES CURRENTLY IN USE

Greene and Vermillion (1960) described their index, the 'oral hygiene index.' This was based upon the extent to which dento-gingival plaque covered the vestibular and lingual surfaces of all the teeth, as well as upon the presence of extrinsic stains. The highest score in any sextant was taken as the score for that sextant. The same authors (Greene and Vermillion, 1964) described a 'simplified oral hygiene index' in which the vestibular or lingual aspects of only 6 selected teeth were examined.

The 'plaque index' (Silness and Loë, 1964; Loë, 1967) has probably been more widely used than any other comparable epidemiological index for clinical studies. It calls for the detection and recording of the presence of plaque on all 4 surfaces of every tooth present (Loë, 1967), although in the study which introduced the 'plaque index' it was applied to 6 selected teeth (Silness and Loë, 1964) only.

The plaque control record presented by O'Leary, Drake and Naylor (1972), makes use of a chart in which each of the 4 surfaces of each tooth (but not the occlusal or incisal surface) is represented. Both a disclosant and an explorer are used to establish the presence of plaque. Any plaque at the dento-gingival junction, irrespective of its amount, is recorded with a dash.

Davies, Horowitz and Wanda (1974) described a new system for recording 'oral debris.' (Dento-gingival plaque) (Fig. 1). They sub-divided the mouth into 6 segments or sextants, and each sextant into vestibular (buccal or labial) and lingual (or palatal) aspects. They used the following criteria for scoring dento-gingival plaque:-

2 = visible deposit
1 = deposit on probing
0 = no deposit

If dento-gingival plaque is observed on either aspect of any one or more teeth within a sextant, the highest score applicable to any surface is given to the entire sextant. Davies *et al* (1974) do not make it clear whether a disclosant should be used, or whether any particular attention is paid to the interproximal area.

ORAL DEBRIS INDEX

		8 - 4	3 - 3	4 - 8
UPPER	V			
	L			
LOWER	V			
	L			

Visible deposit = 2
Deposit on probing = 1
No deposit = 0

Fig. 1 **Recommended system for recording plaque. (From Davies, Horowitz & Wanda (1970): Reproduced with kind permission of the authors and the editor of the** *Journal of Periodontal Research*).

CLINICAL VALUE OF THE INDICES

In the 'oral hygiene index', Greene and Vermillion (1960) take into account the presence of extrinsic dental stain; but reduction in stain intensity certainly reflects aesthetic considerations but is not as significant in terms of disease as is dento-gingival plaque (Mandel, 1974). These authors as well as Silness and Loë (1964) require estimation of the extent to which the surfaces are covered by plaque. It is doubtful whether an estimation of the extent of the plaque beyond the gingival area has any real clinical value. Although the severity of gingivitis is related to the quantity of plaque, few clinicians will condone a standard of oral hygiene which permits one-third of the surfaces of the teeth to be covered by plaque, let alone two-thirds or more as recorded by the higher scores in the indices reviewed above.

Silness and Loë (1964) and Loë (1967) refer to a "film", "moderate accumulation" and "an abundance" of plaque or soft debris. These terms place great strain upon judgement of the examiner, particularly when 4 surfaces of every tooth in the arch are to be examined. The detail and accuracy of these indices is undoubtedly justifiable for epidemiological surveys, or clinical studies; but a simpler system which bears greater relevance to clinical realities is preferred for everyday use.

The method used by O'Leary (1972) in his "plaque control record" is more practical in that only the simple presence of plaque is noted; but an elaborate precedure is prescribed for the recording of the information.

The zoning of the mouth into sextants (Fig. 1) as recommended by Davies *et al* (1974) and Greene and Vermillion (1960) seems appropriate in relating any plaque index to the teaching of oral hygiene, because the positioning of the toothbrush is identical for brushing all the teeth within a sextant, and the positioning of the fingers is identical for flossing all the interproximal areas within a sextant.

Epidemiological studies (Silness and Loë, 1964; Lövdal, Arnö and Waerhaug, 1958) have established that the lesions of periodontal disease are most numerous and most extensive interproximally, yet Arnim (1963) has shown that disclosing solutions do not effectively demonstrate the presence of interproximal plaque. It is common clinical experience that after application of a disclosing solution, interproximal plaque removed on a probe may not be stained. In any case the interproximal surface of a tooth where an adequate contact point exists, is not visible to the naked eye. The assessment of plaque in the critical interproximal area is therefore most reliably done by means of a probe.

The assessment of plaque on selected teeth has been shown to be statistically as accurate as whole-mouth surveys for epidemiological purposes (Greene and Vermillion, 1964). In clinical practice, however, with repeated assessments, a patient may become aware that his oral hygiene performance is being assessed in terms of selected teeth, and by concentrating his oral hygiene efforts on these selected teeth, he may achieve spuriously low scores. On the other hand certain tooth surfaces, on which plaque is consistently present, will not be scored if they are not one of the selected surfaces. Any plaque index intended for long-term monitoring of plaque control that relies on selected teeth, must be considered suspect for this reason.

The new index - The Plaque Control Index

The plaque control index is an adaptation of the method used by Davies *et al* (1974) for recording dento-gingival plaque. The presence of plaque is detected by means of a probe, or by using a disclosant in conjunction with a probe; but never by using a disclosant alone. Plaque

THE PLAQUE CONTROL INDEX

No.			8 - 4	3 - 3	4 - 8	
Date:	UPPER	V				
		I				
		L				
	LOWER	V				
		I				
		L				SCORE:

Fig. 2a **Chart used for recording the *Plaque Removal Index*.**
V = vestibular (buccal and labial)
I = interproximal
L = lingual (or palatal)

present is recorded on the chart shown in Fig. 2a. The mouth is divided into 6 segments, or sextants, with provision for the recording of vestibular, lingual, and interproximal plaque, according to the following criteria:-

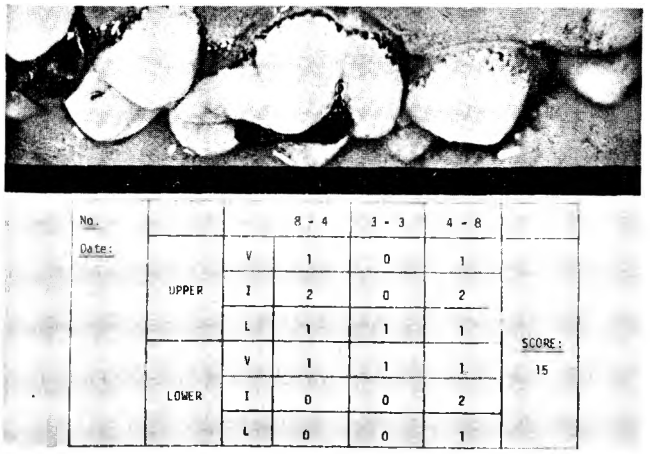
Where plaque is present interproximally anywhere within a sextant — Score 2

Where plaque is present on the vestibular or lingual surface of any tooth within a sextant — Score 1

Where there is no plaque interproximally, vestibularly or lingually within a sextant — Score 0

Note:-

1. Interproximal plaque may be defined as plaque on the interproximal surface of a tooth between its vestibular and lingual line angles.
2. Only plaque at the dento-gingival junction is scored.
3. The distal surfaces of the canines are regarded as being within the posterior sextants. However. where the tooth immediately distal to the canine is absent, the distal aspect of the canine should be scored in the anterior sextant.
4. All the scores are added to give the *plaque control index* score, with a maximum possible score of 24 if there are teeth in all sextants (Fig. 2b).



No.			8 - 4	3 - 3	4 - 8	
Date:	UPPER	V	1	0	1	
		I	2	0	2	
		L	1	1	1	SCORE:
	LOWER	V	1	1	1	15
		I	0	0	2	
		L	0	0	1	

Fig. 2b **An example of plaque observed on the lingual aspect of the upper right molars with a completed plaque control index chart for the mouth.**

DISCUSSION

The *plaque control index* has been used in clinical practice and found to be quick and simple to use, and easily understood by patients. The index has been of particular clinical value for the following reasons:-

1. The index yields a numerical value that can be compared from visit to visit.
2. It has been shown that the incidence and severity of periodontal lesions are greatest in the interproximal zones (Silness and Loë, 1964; Lövdal *et al*, 1958). Accordingly, a higher score of 2 has been allotted to interproximal plaque to bring this fact repeatedly to the attention of both patient and auxiliary personnel.
3. It indicates to both examiner and patient in which sextant plaque control techniques have been ineffective. It indicates immediately which phase of the oral hygiene technique is at fault: where there is a score of 2 in the sextant block, it suggests that the problem is concerned with flossing; or should there be a score of one, brushing is at fault.

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