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PERIODONTAL DISEASE IN PREGNANCY

III. RESPONSE TO LOCAL TREATMENT

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INTRODUCTION

The manner in which the periodontium is influenced by pregnancy has been the subject of much discussion. Some have considered that pregnancy gingivitis is caused by local irritants and that gingival inflammation is accentuated during pregnancy. Others have maintained that the gingival condition in pregnant women is dependent upon the effect of the special hormonal balance and that the part played by local oral deposits is that of an aggravating more than a causative factor (*Ziskin et al.*, 1933, 1946). Consistent with this view *Huber* (1938) stated that pregnancy gingivitis should be looked upon as a physiological condition. Recent epidemiologic research, however, has shown a close correlation between periodontal disease and oral debris (*Lövdal et al.*, 1958, *Schei et al.*, 1959). Histologic (*Waerhaug*, 1952, 1955), biochemical (*Schultz-Haudt*, 1960) and experimental research (*Löe et al.*, 1965) have also indicated that oral deposits are the dominating factor in the development and maintenance of non-specific periodontal inflammation.

In the two first papers of this series (*Löe & Silness,* 1963, *Silness & Löe,* 1964) a close relationship was shown to exist between lack of oral hygiene and periodontal disease in pregnant women. However, the finding that this correlation was closer after parturition than during pregnancy suggested that during gestation an additional factor is introduced, which together with the existing oral debris may be responsible for the accentuated inflammatory changes in the gingiva.

The aim of the present investigation was to gain more information on the relative importance of these factors by studying the gingiva of pregnant women after removal or reduction of soft and hard deposits.

MATERIAL AND METHODS

Sixty out of the 121 pregnant women who participated in the two first series of this investigation (*Löe & Silness,* 1963, *Silness & Löe,* 1964) were given local conservative therapy consisting in the removal of mineralized deposits and correction of the overhanging margins of dental restorations. They also received instruction in oral hygiene measures using toothbrushes and woodpoints.

At the first examination beginning the period of oral hygiene scores were obtained according to the criteria of the Plaque Index system (*Silness & Löe,* 1964). An assessment of the mineralized deposits was made in accordance with the Calculus Index system of *Ramfjord* (1959).

The periodontal condition was assessed by the Gingival Index (GI) system (*Löe & Silness,* 1963) as well as the Periodontal Index (PI) system of *Russell* (1956). Pocket depth measurements were made as described in the first communication in this series to which the reader is referred. Prior to examination the gingivae and the teeth were dried by a blast of air. No cotton was used in order not to interfere with the soft deposits.

Subsequent to the first examination the patients were instructed in correct oral hygiene measures and then seen at varying time intervals to check the new oral hygiene routine and to have mineralized deposits removed and imperfect margins of restorations corrected.

An intermediate full assessment of deposits and periodontal condition was made after a two weeks interval and the final assessment took place during the 7th month of pregnancy. The participants were examined and treated by one operator.

In the assessment of the data, the 7th, 8th and 9th month groups were excluded in order to allow observation periods of reasonable length and to avoid the last trimester at the end of which a decrease in gingival inflammation seems to occur naturally (*Hilming,* 1950, *Löe & Silness,* 1963). Thus, the test population consisted of thirty-three individuals averaging twenty-six years of age.

RESULTS

Oral hygiene

On average the oral hygiene was not good at the start of the hygiene period. The mean Plaque Index and the Calculus Index

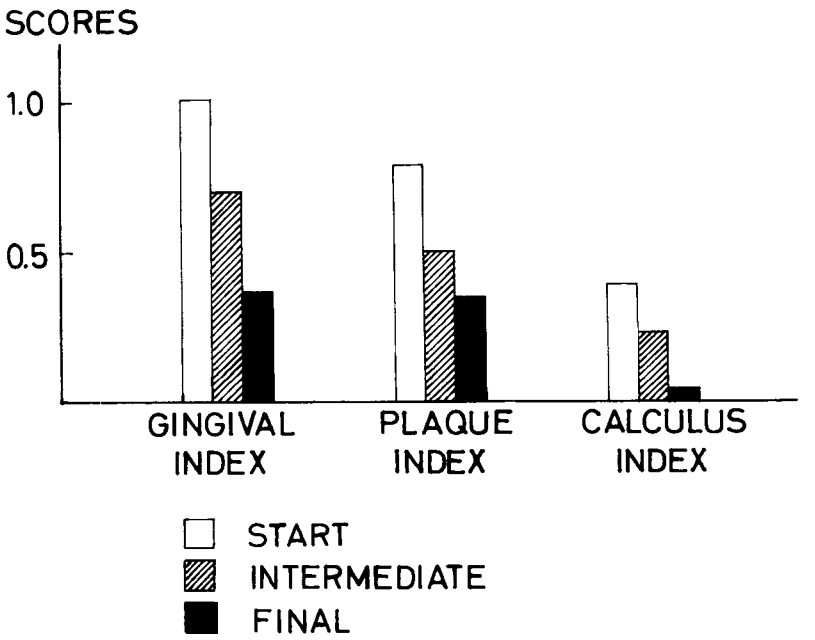

Fig. 1. Diagrammatic presentation of the mean gingival, plaque and calculus index scores at the start of the hygiene period, at the intermediate visit and at the final assessment.

of the group is shown in Table I. During the period of improved oral hygiene the amounts of soft and mineralized deposits were reduced in all patients as evidenced by the decrease in mean Plaque Index from 0.79 to 0.35 and the reduction of the mean Calculus Index from 0.39 to 0.04.

Table I

Mean Plaque Index and Calculus Index at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Plaque Index	Calculus Index
Start	0.79	0.39
Intermediate	0.50	0.23
Final	0.35	0.04

A comparison between the groups of teeth (incisors, premolars, molars, Table II) showed that there was no difference between the premolars and molars in percentage plaque reduction (about 50 per cent) whereas the reduction amounted to 75 per cent in the incisors.

Table II

Mean Plaque Index and Calculus Index for the groups of teeth at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Start		Intermediate		Final	
Groups of teeth	Plaque Index	Calculus Index	Plaque Index	Calculus Index	Plaque Index	Calculus Index
Incisors	0.60	0.31	0.35	0.18	0.15	0.01
Premolars	0.72	0.33	0.47	0.22	0.35	0.03
Molars	1.04	0.53	0.69	0.30	0.53	0.05

The mean scores for the different areas of the teeth (Table III) showed marked differences between the buccal, lingual and interproximal surfaces. The reduction in the amount of plaque

as expressed by the scores, amounted to about 50 per cent for the interproximal aspects of the teeth whereas the lingual areas showed a decrease of about 55 per cent. The buccal surfaces, on the other hand, seemed to be almost completely devoid of plaque at the final assessment.

Table III

Mean Plaque Index and Calculus Index for different areas of teeth at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Start		Intermediate		Final	
Areas of teeth	Plaque Index	Calculus Index	Plaque Index	Calculus Index	Plaque Index	Calculus Index
Buccal	0.20	0.10	0.06	0.07	0.02	0.01
Lingual	0.59	0.51	0.36	0.28	0.21	0.04
Inter-proximal	1.19	0.48	0.79	0.29	0.58	0.03

None of the pregnant women were familiar with an adequate tooth cleansing routine at the start of the oral hygiene period and only a few of them accepted with enthusiasm a change in their habitual toothbrushing method as part of the pregnancy hygiene. Nevertheless, the mean Plaque Index for all participants was lower at the final assessment than at the beginning.

On the whole, there was no marked difference in the reduction of clinically detectable calculus between the groups of teeth (Table II) nor between the different areas of the teeth (Table III).

Periodontal condition

At the start of the oral hygiene period all pregnant women showed inflammatory gingival changes of moderate severity. This was expressed by the Gingival Index (Table IV) which showed a mean score of 1.01 for the group. The mean Periodontal Index was 1.29.

Table IV

Mean Gingival Index and pocket depths (millimeters) at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Gingival Index	Pocket depth
Start	1.01	3.2
Intermediate	0.70	2.9
Final	0.37	2.6

The main symptom complained of was bleeding during tooth brushing. In the course of the hygiene period the mean Gingival Index dropped to 0.37 and the corresponding score for the Periodontal Index was 0.41, i.e. a decrease of about 65 per cent in both indices. This decrease was found for all groups of teeth (Table V) and was greatest in the incisor group which showed about 75 per cent reduction in the mean Gingival Index. The corresponding value for the molar group was about 50 per cent while the premolars showed about 65 per cent reduction.

Table V

Mean Gingival Index and pocket depths (millimeters) for the groups of teeth at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Start		Intermediate		Final	
Groups of teeth	Gingival Index	Pocket depth	Gingival Index	Pocket depth	Gingival Index	Pocket depth
Incisors	0.88	2.9	0.58	2.6	0.21	2.3
Premolars	0.96	3.1	0.68	2.8	0.33	2.6
Molars	1.19	3.7	0.85	3.4	0.56	3.0

Variations in the indices were also seen when the different areas of the teeth were compared (Table VI). The decrease in scores for the interproximal and lingual surfaces was approximately of the same order and amounted to about 58 and 61 per cent respectively. The buccal areas, on the other hand, had a markedly lower index at the final assessment (GI = 0.06), sig-

nifying that the greater part of these gingival units were clinically healthy.

The mean pocket depths for the whole group of pregnant women are shown in Table IV. During the hygiene period there was a reduction in mean pocket depth from 3.2 mm to 2.6 mm. There was no marked variation between the different groups of teeth with regard to pocket depth reduction, since all three groups showed a reduction of approximately half a millimeter (Table V). However, when the measurements for the different areas were compared (Table VI) it appeared that the interproximal pockets showed the greatest reduction (0.9 mm). No difference was found between buccal and lingual pocket depth reduction (0.3 mm).

Table VI

Mean Gingival Index and pocket depths (millimeters) for different areas of teeth at the start of the hygiene period, at the intermediate visit and at the final assessment.

	Start		Intermediate visit		Final	
Areas of teeth	Gingival Index	Pocket depth	Gingival Index	Pocket depth	Gingival Index	Pocket depth
Buccal	0.41	2.2	0.24	2.1	0.06	1.9
Lingual	0.81	2.5	0.55	2.1	0.27	2.2
Interproximal	1.41	4.1	1.01	3.6	0.58	3.2

Correlation between periodontal condition and oral hygiene

More detailed analysis of the data (Table VII) shows that at the final assessment 473 out of 768 gingival areas scored GI = 0. This represents an increase of 248 areas scoring zero since the first examination. The corresponding figures for the Plaque Index showed that 185 clean areas had been added during the hygiene period (448 areas scoring zero). The increase in number of areas scoring zero for both indices took place throughout the circumference of the teeth. It is noteworthy, however, that the majority of the buccal areas scored GI = 0 within a two-week

period following instruction in oral hygiene, while less than half the number of the final lingual and interdental areas showing no inflammation at the final assessment, scored GI = 0 after the two first weeks.

At the final assessment the number of areas showing normal gingiva correlated well with the number of clean surfaces. Out of 160 non-inflamed interproximal areas 153 units were recorded as devoid of plaque. A similar correspondance was also found for the lingual areas where 131 out of 135 scored zero with both the Gingival Index and the Plaque Index. On the buccal aspect 164 out of 178 gingival areas scored similarly.

At the final assessment inflammation persisted in 295 gingival areas, 224 out of which were confined to the interdental papillae (Table VII). However, the moderate to severe inflammation which existed interproximally at the start of the investigation had changed to mild inflammation at the end.

Table VII

Number of different areas scoring zero with the gingival Index and Plaque Index at the start of the hygiene period, at the intermediate visit and at the final assessment.

		Zero score areas					
		Start		Intermediate		Final	
	No. of areas	Gingival Index	Plaque Index	Gingival Index	Plaque Index	Gingival Index	Plaque Index
Buccal	192	125	134	167	163	178	164
Lingual	192	64	82	96	120	135	131
Inter-proximal	384	36	47	90	118	160	153
Total	768	225	263	353	401	473	448

From Table VII it may be seen that plaque was finally recorded on 320 surfaces and that 231 of these were interdental areas. The persisting interproximal lesions were regularly accompanied by the presence of registrable plaque on the adjacent tooth surfaces.

DISCUSSION

This study has shown that when pregnant women are taught correct oral hygiene procedures there is a general reduction in the amount of oral debris detectable at subsequent visits.

Although all groups of teeth (molars, premolars and incisors) and all areas of the individual teeth (buccal, lingual and interproximal) showed such a reduction, the change was most conspicuous on the buccal aspects of the teeth. Nearly all buccal surfaces were devoid of plaque two weeks following initial oral hygiene instruction and continued free of plaque for the remaining period of gestation. The fact that several lingual and particularly interproximal surfaces showed presence of soft debris after instruction had been given may have been due to the greater difficulty in cleansing these areas. It is a common observation in periodontal practice that the initial motivation of the patient and the instructions in oral hygiene must be followed up by regular controls and reinstructions in order to secure a permanent improvement. In order to standardize the procedures used in this investigation as much as possible, the motivation of each participant and oral hygiene instruction was confined essentially to only one visit at the start of the experiment. The majority of the participants belonged to the lower socio-economic strata and showed limited interest in the project. In evaluating the results, therefore, due consideration must be given to these latter factors.

Notwithstanding these inadequacies, this investigation has demonstrated that the degree of gingival inflammation present during pregnancy (pregnancy gingivitis) is clearly related to the state of oral hygiene of the patient (Fig. 1). A definite reduction in distribution and severity of the gingival lesions occurred in all the women in this study, in each group of teeth as well as in all areas of each tooth, and the reduction in gingival inflammation was accompanied by a decrease in pocket depth corresponding to this. Already two weeks after the start of the home care program the majority of the buccal inflammatory areas had returned to a healthy state. The prolonged time required for the lingual and interproximal lesions to resolve was probably due to the greater severity of the inflammatory changes in these areas

at the start of the experiment and/or to the afore mentioned difficulties in keeping these tooth surfaces clean. In any event, the data from the final examination during the 7th month of pregnancy show that a close correlation exists between the number and the location of resolved gingival areas and the tooth surfaces then devoid of soft deposits. In this respect this analysis corroborates that of the previous data in this series (*Silness & Löe,* 1964) and reemphasizes the cause and effect relationship between bacterial plaque and pregnancy gingivitis. Mineralized deposits seem to be of less importance in this context, since a complete removal of calculus alone did not appreciably influence gingival inflammation.

The essential finding in this investigation is that provided the teeth are kept free of plaque complete resolution of preexisting gingival inflammation takes place during a period of pregnancy when the gingival inflammatory response (*Löe & Silness,* 1963) and hormonal activity (see *Löe,* 1965) are likely to be increased. This suggests that bacterial plaque is the most important factor in the initiation and maintenance of gingival inflammation in pregnant women and that the aggravation of the inflammatory response of the gingiva commonly seen during pregnancy is due to the altered tissue metabolism of pregnancy.

SUMMARY

Thirty-three of the 121 pregnant women who participated in the previously reported studies on periodontal disease in pregnancy were given local conservative periodontal treatment and instruction in oral hygiene. Assessment of soft and mineralized deposits and of the periodontal condition was made before the start of the experiment, two weeks following instruction and at the 7th month of pregnancy.

The investigation has shown that inflammation can be abolished and normality maintained during pregnancy provided the gingival areas of the teeth are kept clean. This observation suggests that bacterial plaque is responsible for the initiation and maintenance of gingival inflammation in pregnant women and that the accentuated inflammatory response is due to the altered tissue metabolism associated with pregnancy.

RÉSUMÉ

AFFECTIONS PARODONTALES PENDANT LA GROSSESSE

III. RÉPONSE AU TRAITEMENT LOCAL

Parmi les 121 femmes enceintes qui participaient aux études sur les affections parodontales pendant la grossesse dont il a été rendu compte précédemment, 33 femmes ont reçu un traitement conservateur parodontal local et des instructions concernant l'hygiène bucco-dentaire. L'enregistrement des dépôts mous et des dépôts tartriques et l'enregistrement de l'état du parodonte ont été faits avant le début de l'expérience, deux semaines après que les instructions aient été données et au septième mois de la grossesse.

Cette étude a montré que l'inflammation peut être supprimée et l'état normal maintenu pendant la grossesse à condition que les zones gingivales des dents soient maintenues propres. Cette observation semble indiquer que la plaque microbienne est responsable du début de l'inflammation gingivale et du maintien de cette inflammation chez la femme enceinte, et que la réponse inflammatoire accentuée est due à une altération du métabolisme des tissus qui serait associée à la grossesse.

ZUSAMMENFASSUNG

PARODONTALE ERKRANKUNGEN UND SCHWANGERSCHAFT

III. ANTWORT AUF LOKALE BEHANDLUNG

Dreiunddreissig aus einer Gruppe von 121 schwangeren Patienten, die auf das Vorkommen und die Schwere parodontaler Erkrankungen untersucht worden waren, wurden lokale Behandlung und Instruktion einer verbesserten Mundhygiene gegeben. Das Schätzen von weichen und harten Belägen und vom gingivalen Zustande fand vor dem Experiment, zwei Wochen nach der Instruktion und im Laufe des siebenten Monats statt.

Die Untersuchung hat gezeigt, dass gingivale Inflammation beseitigt und normale Zustände aufrechterhalten werden können,

vorausgesetzt, dass die weichen Beläge durch eine angemessene Mundhygiene entfernt werden. Diese Observation dürfte die Schlussfolgerungen berechtigen, dass das bakterielle Plaque für den Anfang und das Aufrechterhalten gingivaler Inflammation während der Schwangerschaft verantwortlich sei, und dass die akzentuierten inflammatorischen Veränderungen auf den Stoffwechsel der Gewebe während der Schwangerschaft zurückzuführen seien.

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