

The effects of hormonal contraceptives on the human periodontium

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The periodontal status of the six teeth of the Ramfjord P. D. I. in 89 women aged 17-23 years who were taking an oral contraceptive was compared with a group of 72 in the same age bracket practising other forms of contraception. Mean plaque scores for the two groups showed no significant difference, but were slightly lower in the hormonal group. G. I. scores for the hormonal group were slightly higher than for the other group, but the difference was not significant. Those who had been on oral contraceptives for more than 1.5 years (mean 3.0 years) had a lower plaque score than those who had taken them for less than 1.5 years (mean 0.7 years) but their G. I. was greater, and their mean amount of periodontal destruction significantly greater than in the shorter time group and in those of comparable age using other forms of contraception.

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The effects of female sex hormones upon the gingivae have recently been reviewed by Hugoson (1970), and case reports have been presented in which abnormal reactions were noted in the gingivae of women taking these drugs (Lynn 1967, Kaufman 1969, Chevallier 1970).

Clinical trials studying the effects of hormonal contraceptives upon the gingivae have all shown an alteration in these tissues. Lindhe and Björn (1967) and El-Ashiry et al. (1971) observed increases in the crevicular fluid exudate and inflammation in the gingivae of women taking hormonal contraceptives. Plaque levels were found to remain constant in the trial of Lindhe and Björn (1967).

Lindhe, Attström and Björn (1968 a, b) found that injection of progesterone plus oestrogen increased the amount of crevicular fluid in dogs and Lundgren and

Lindhe (1971) studied the effects of increased blood levels of progesterone and oestrogen on the progress of periodontal disease in hamsters. Comparisons with a control group showed no significant differences in bone loss, whereas Roth, Lin and Liu (1972) reported conflicting evidence concerning bone loss when female Holtzman rats were injected with different amounts of norethynodrel plus mestranol.

Only Das, Bhowmick and Dutta (1971 a, b) have studied the effect of oral contraceptives on the progress of periodontal disease in humans and although they considered that destructive periodontal disease was significantly higher in women taking oral contraceptives, they concluded that oral contraceptives had no effect on the depth of pockets! In view of this apparent contradiction, an investigation was undertaken to examine and compare the periodontal status

of women who were receiving hormonal contraceptives with those who were practising other forms of contraception.

Materials and Methods

Participants in this study were selected from those attending the Margaret Pyke Centre of the Family Planning Association in London.

To be eligible subjects had to comply with the following criteria:

- (i) be aged 17–23 years
- (ii) if taking hormonal contraceptives to have started at either 17, 18 or 19 years of age, i.e. a woman aged 21 would have been taking hormones for 2, 3 or 4 years. Anyone having a full denture was excluded.

Women were excluded from the control group if they had ever taken hormonal contraceptives and from the experimental group if there had been any breaks in continuity in taking "the pill".

In order to eliminate examiner bias the age of participants, duration of hormone administration and group classification were recorded at the reception desk and neither the examiner nor his assistant had access to this information throughout the survey.

All patients were examined using good illumination and standardized conditions.

Initial trials using the Ramfjord (1959) method of measuring pocket depth from the cemento-enamel junction were found unreliable and to overcome this a number of Cross Calculus Probes were calibrated against a Williams Graduated Periodontal Probe. The horizontal projection at the end of the Cross Calculus Probe enabled greater accuracy in location of the cemento-enamel junction.

Prior to examination a cotton-wool roll was placed in the vestibule adjacent to the tooth to be examined and tooth and associated gingivae were gently blown dry with a chip syringe.

Ramfjord's (1959, 1967) six teeth were used as representative of the whole mouth. The amount of plaque and the gingival state were scored according to the systems of Silness and Løe (1964) and Løe and Silness (1963). Pockets were measured on the mesio-buccal aspect and midway buccally as recommended by Ramfjord (1959, 1967). The score for each tooth was expressed as a quantitative figure by summing the scores and dividing by the number of teeth. The figure was, therefore, twice the mean amount of attachment loss around each tooth measured.

Differences between mean scores for the Plaque Index, Gingival Index and Loss of Attachment were subjected to a Student *t* Test.

Table 1
Relation between time on oral contraceptive and age

Years on hormonal contraceptive	Age							Mean age in relation to duration of hormonal contraception
	17	18	19	20	21	22	23	
0.0-0.5	4	3	5	1	1			18.8
0.6-1.5	2	2	15	10	1			19.6
1.6-2.5		3	3	7	5	1		21.1
2.6-3.5					3	5	5	22.9
3.6-5.5			1			2	10	23.8
	6	8	24	18	10	8	15	Total 89

Table 2

Age distribution of control group	
Age in years	Number of individuals
17	3
18	13
19	10
20	8
21	13
22	14
23	11
	72

Results

171 women were examined, 89 of whom had been taking hormonal contraceptives for varying lengths of time (Table 1). A further 72 women using other forms of contraception acted as a control (Table 2). Hormonal contraceptives of varying progesterone concentrations had been prescribed and a summary of each drug and the number of women taking it are presented (Table 3). As the majority of women were receiving low progesterone levels no differentiation has been made in this study.

Plaque accumulation in the control group (0.81 ± 0.08) was slightly greater than in the hormonal group (0.76 ± 0.07) but the differ-

ence was not significant ($p > 0.05$) and the groups could be regarded as comparable with regard to the amount of gingival irritation from plaque.

When the gingival scores were compared, that for the hormonal group (0.75 ± 0.05) was slightly greater than in the control group (0.70 ± 0.05) but the difference was not significant ($p > 0.05$).

The difference in the loss of attachment score of the hormonal group (0.72 ± 0.07) compared to the control group (0.62 ± 0.08) was not significant ($p > 0.05$).

In view of this trend, analysis was made to see if longer time on the contraceptive pill was associated with a higher mean loss of attachment score than was a shorter time. The hormonal group was divided into those who had been taking contraceptives for 1.5 years or less (mean 0.7 years) and those who had been taking contraceptives for longer periods (mean 3.0 years). By dividing the control group into those aged < 20 years and those aged ≥ 20 years, two groups were produced whose mean ages differed little from those of the two hormonal groups (Table 4).

A significant difference was observed in the mean loss of attachment of those women who had been taking hormonal contracep-

Table 3

Types of Oral Contraceptives Used

Brand Name	Progesterone Content	Estrogen Content	Number in Group
Minovlar	1 mg. Norethisterone Acetate	0.05 mg. Ethinyloestradiol	63
Norinyl 1	1 mg. Norethisterone	0.05 mg. Mestranol	
Orthonovin	1 mg. Norethisterone	0.05 mg. Mestranol	
Ovulen 50	1 mg. Ethynodiol Diacetate	0.05 mg. Ethinyloestradiol	
Norlestrin	2.5 mg. Norethisterone Acetate	0.05 mg. Ethinyloestradiol	19
Minilyn	2.5 mg. Lynestrenol	0.05 mg. Ethinyloestradiol	
Gynovlar 21	3 mg. Norethisterone Acetate	0.05 mg. Ethinyloestradiol	4
Anovlar	4 mg. Norethisterone Acetate	0.05 mg. Ethinyloestradiol	3
Volidan	4 mg. Megestrol Acetate	0.05 mg. Ethinyloestradiol	

Table 4

Mean Plaque Index, Gingival Index and Loss of Attachment Scores of Groups

Group	Years of Hormone Administration	Mean	Mean Age	Number of Subjects	P.I. Mean \pm S.E.	G.I. Mean \pm S.E.	Loss of Attachment* Mean \pm S.E.
Hormone Group	< 1.5	0.7	19.3	45	0.80 \pm 0.07	0.73 \pm 0.05	0.64 \pm 0.07
	> 1.5	3.0	22.3	44	0.72 \pm 0.06	0.78 \pm 0.05	0.80 \pm 0.06
Control Group			19.1	34	0.85 \pm 0.09	0.72 \pm 0.06	0.65 \pm 0.07
			22.5	38	0.80 \pm 0.07	0.67 \pm 0.01	0.60 \pm 0.08

* mean equals twice site loss

tives longer than 1.5 years ($p < 0.05$) when compared with those taking contraceptives for a shorter period and with the control group of comparable age (Table 4) but differences in the G.I. and P.I. scores between these groups were not significant ($p > 0.05$).

Discussion

Differences in gingival inflammation between the two groups were not significant. El-Ashiry et al. (1971) showed a difference in inflammation significant at the 1% level of confidence, however, they and Lindhe and Björn (1967) only examined the anterior segments where gingivitis is known to be more severe and the effects of sex hormones more marked (Løe & Silness 1964).

The measurements of periodontal pockets showed a small but significant difference ($p < 0.05$) between the hormonal group who had been taking contraceptives longer than 1.5 years (0.80 ± 0.06) when compared to the control group (0.60 ± 0.08).

Dick and Trott (1969) found that traumatically produced nonspecific inflammation enhanced an Arthus phenomenon induced in the oral tissues of mice, and it seems that this concept may be relevant to variation in host resistance to plaque throughout the population. The host resistance in a non-specific inflammatory re-

sponse of the gingivae may be altered in such a way that predisposes to the development of periodontal disease in women taking hormonal contraceptives. More detailed analysis of the results did in fact show that women with low plaque scores < 0.7 who had been taking oral contraceptives for > 1.5 years had a significantly ($p < 0.05$) greater loss of attachment than those of the same mean age whose plaque score was < 0.7 and who were practising other forms of contraception.

This study demonstrates that although no significant differences in plaque levels and gingivitis levels existed between a group of women taking hormonal contraceptives and a comparable control, those who were receiving hormones for more than 1.5 years exhibited greater periodontal destruction than those of comparable age in the control group. It is postulated that this difference may be due to an altered host resistance of the hormone group.

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