VITAMIN C STATUS IN THE WOMEN TAKING COMBINATION CONTRACEPTIVES CONTAINING EITHER 50 OR 30 μGM OF ETHINYL ESTRADIOL

by

UDAY MADHAV DONDE,* M.Sc., Ph.D.
PRAVIN DATTATRAYA POTDAR,** M.Sc., D.M.L.T.
and
USHA MADHUSUDAN JOSHI,† M.Sc., Ph.D.

Introduction

Oral combination contraceptive pills have been shown to alter the status of several water soluble vitamins and produce changes in the metabolism of lipids, proteins, carbohydrate, and minerals. (Briggs and Briggs, 1974; Joshi, 1979). Estrogen content has been thought to be responsible for these changes. Most of the studies reported so far have been carried out with combination pills containing 50 μgm of ethinyl estradiol (EE_2). Such studies with pills containing 30 μgm of EE_2 are seldom reported (Briggs, 1976; Prasad *et al*, 1977). Hence, a project on the assessment of vitamin C status was undertaken to see whether the contraceptive pills containing reduced doses of estrogens (reduction from 50 μg of EE_2 to 30 μgm) would give the results different from those reported earlier with higher estrogen containing pills and to correlate the changes, if any, with the duration of intake.

Material and Methods

Women attending family welfare clinics attached to Institute for Research in Reproduction were enrolled for the study. The mean age was 25 years (range 19-31 years). All were non smokers and their vitamin C intake was between 50 to 75 mg per day.

Three groups of women were studied. Group I consisted of 17 healthy women from comparatively a better socio-economic class and their vitamins C intake was between 75 to 100 mg per day. Majority of them were staff members and students of the Institute. Group II was of 16 women taking a combination pill containing 50 μgm of EE_2 and Group III was of 14 women taking a pill containing 30 μgm of EE_2.

Fasting venous blood was collected between the day 10 and day 20 of the respective cycles to avoid cyclic variations in the blood biochemical parameters. The women in Group II and III were followed up before contraception and during 1st, 3rd, 6th and 12th cycles of contraceptive usage. Urine samples at each follow up intervals were collected in the morning and were analysed immediately.

Plasma, leukocyte and urinary ascorbic acids were estimated by the method of Dasgupta *et al* (1962). Leukocyte separation was done according to the method of Densone and Bower (1961). The yield of leukocyte separated was checked by do-

*Research Officer.
**Sr. Research Fellow.
+Assistant Director.
Division of Clinical Chemistry Institute for Research in Reproduction, Parel, Bombay-400 012.
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ing absolute leukocyte count and whole blood leukocyte count and was found to be 95%.

Results

Table I shows the results of ascorbic acid levels in plasma, leukocyte and urine in all the three groups. Plasma and urinary ascorbic acid levels were unchanged after taking pills. However, a significant reduction of 44% ($P < 0.001$) in leukocyte level was observed. Table II shows the results with respect to the duration of intake. Leukocyte ascorbic acid levels

TABLE I

Ascorbic Acid Levels in Plasma, Leukocyte and Urine (Mean ± S.D.)

Group	No. of cases	Duration	PAA mg%	LAA μgm/10^8 cells	UAA mg%
I	17	Initial	1.09 ± 0.36	26.38 ± 9.1	6.47 ± 3.38
II	15	Initial	0.865 ± 0.26	26.89 ± 8.10	6.68 ± 4.17
	15	6 months after Ovral	0.843 ± 0.21	14.05* ± 4.38	6.46 ± 2.85
	4	12 months after Ovral	0.821 ± 0.13	15.10* ± 3.10	7.15 ± 2.68
III	16	Initial	0.825 ± 0.28	26.84 ± 8.35	7.06 ± 4.25
	16	6 months after Nordette	0.850 ± 0.18	15.25** ± 5.10	7.35 ± 3.25
	4	12 months after Nordette	0.820 ± 0.11	15.80** ± 2.10	7.32 ± 2.40

*Statistically significant $P < 0.001$
PAA—Plasma ascorbic acid
LAA—Leukocyte ascorbic acid
UAA—Urinary ascorbic acid
Ovral—Levo-Norgestrel 250 μgm + EE_2 50 μgm.
Nordette—Levonorgestrel 250 μgm + EE_2 50 μgm.

TABLE II

Results with Respect to the Duration of Intake of Pills
(Mean ± S.D.)

Duration	No. of Cases	PAA mg%	LAA μgm/10^8 cells	UAA mg%
Before O.C.	31	0.845 ± 0.28	26.85 ± 8.15	7.46 ± 4.20
After O.C.				
1 month	6	0.681 ± 0.15	16.10* ± 7.91	6.37 ± 2.39
3 months	7	0.879 ± 0.32	16.68* ± 3.34	6.75 ± 2.12
6 months	31	0.846 ± 0.20	14.65* ± 4.65	7.15 ± 3.05
12 months	8	0.820 ± 0.11	15.90* ± 2.60	7.25 ± 2.50

* Statistically significant $P < 0.001$.
O.C. Oral Contraceptives.

were significantly changed at the end of the one month and did not change further upto 12 months.

Discussion

Vitamin C i.e. ascorbic acid, is one of the essential constituents of the body. It has a role in steroidogensis, collagen synthesis, immune response of the body and also in phagocytic activity (Nungester and Ames, 1948; Harper, 1975). The plasma and leukocyte ascorbic acid levels reported in our studies before taking combination contraceptives were comparable with those reported earlier in non oral contraceptives users. (Loh and Wilson, 1971; Briggs, 1976; Prasad *et al* 1977).

According to Weininger and King, 1977, the reports on the effect of oral combination contraceptives on plasma and urinary ascorbic acid levels are conflicting. We have observed no significant changes in both the parameters. A reduction in both has been reported by River (1975) and Harris *et al* (1973) and has been attributed to altered metabolic turnover rate.

It is known that leukocyte ascorbic acid concentration provides a measure of availability of ascorbic acid for storage and plasma levels give an indication of its metabolic turnover rate (Loh and Wilson, 1971). Leukocyte ascorbic acid in the women after pill, was found to be significantly reduced. The reduction was approximately 44 per cent and was independant of the amount of ethinyl estradiol in the pill. Eastrogen content of the pill is known to produce such changes which are attributed to redistribution of ascorbic acid in tissues (River, 1975). Increase in ceruloplasmin activity (Osaki *et al*, 1964; Saroja *et al*, 1971), decrease in the absorption of dietary ascorbic acid (McLeroy and Schendel, 1973) and decreased levels of reduced glutathione (Saroja *et al*, 1971) have been suggested as the possible reasons for lowering of leukocyte ascorbic acid content. In the women studied, a significant lowering in leukocyte ascorbic acid was observed in the first month and did not decline further during the next 12 months, thus revealing adaptation at an early stage. The clinical consequences of such an adaptation needs to be investigated further.

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