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# Comparative Study of Ovarian Reserve in Users and Non-Users of Oral Contraceptives

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***Abstract:*** *Ovarian reserve is the total number of primordial follicles in the ovary. This study aims to quantify and compare the sonographic ovarian reserve markers in the users and non-users of oral contraceptives.500 women aged 18 – 45 years were studied for a period of 12 months, of which 260 were non-users and 240 were users (of which 30% were former pill users). Sonographic ovarian reserve includes ovarian volume and antral follicular count, which were done using transvaginal ultrasound on day 3 of the cycle. When compared with non-users, in oral contraceptive pill users, antral follicular counts were reduced by ~15 – 20% and ovarian volume was reduced by ~25 – 30%.Fertility potential and ovarian reserve assessment were repeated after the cessation of oral contraceptive pills in patients who wanted to conceive again. In few patients ovaries were smaller in volume with few small antral follicles. After discontinuation of oral contraceptive pills, 20% of patients conceived after 1 month (after 1st cycle). 75% of patients conceived in and after 1 year (after 12cycles). Sonographic ovarian reserve still retains its efficacy, as it is safer and cheaper than hormonal studies.*

***Keywords:*** *Antral follicular count, comparative study, oral contraceptive pills (OCP), sonographic ovarian reserve, transvaginal ultrasound.*

## I. Aims And Objectives

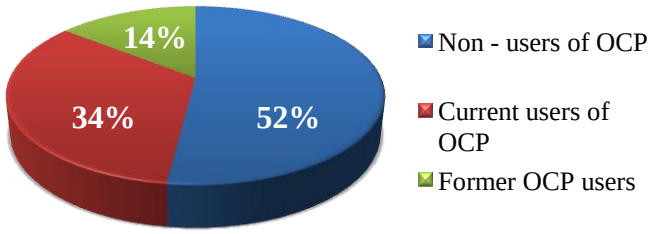
1. To quantify and compare the sonographic ovarian reserve markers in the users and non-users of oral contraceptives.
2. To show that sonographic ovarian reserve assessment still retains its efficacy as it is safer and cheaper than hormonal studies.

## II. Materials And Methods

**1. Study type:** Prospective study.
**2. Demography:** 500 women aged between 18 – 45 years for a period of 12 months, of which 260 were non-users and 240 were users (of which 30% were former pill users). Trans-vaginal ultrasound was performed between day 2–5 of the menstrual cycle to measure the ovarian volume and antral follicular count.
**3. Inclusion criteria: –** Patients who were married and are in reproductive age group (18 to 45 years).
– Patients who were willing to undergo transvaginal ultrasound.
**4. Exclusion criteria: –** Patients who refuse to undergo transvaginal ultrasound.
**–** Patients who lost follow up.
**5. Device -** Mind ray DC-7 ultrasound machine, with V10-4 vaginal transducer with center frequency 6.5MHz.
**6. Investigation done:** Only the patients whose both ovaries were clearly visible on transvaginal sonography were included in the study. Transvaginal sonography was performed on day 2–5 of menstrual cycle or during withdrawal bleeding, using Mindray DC-7 ultrasound machine, with V10-4 vaginal transducer, measurements of the transverse, longitudinal, and antero-posterior diameters of each ovary were made using electronic calipers. All echo-free structures in the ovaries with a mean diameter (of two dimensions) between 2 and 10 mm were counted as antral follicles. The number of antral follicles identified was counted and grouped under three size categories [2–4 mm (small), 5–7 mm (intermediate) and 8–10 mm (large)]. Each ovary was measured in three planes and ovarian volume was calculated using the prolate ellipsoid formula V = D1 x D2 x D3 x 0.523 (D1, D2 and D3 being the three maximal longitudinal, antero-posterior and transverse diameters respectively)[1]. Mean ovarian volume is the volume calculated as the mean value of the left and right ovary.

## III. Results

**Graph 1: Percentage distribution of non-users, current users and former users of OCPs in our study.**




**Graph 2: Age distribution of the patients included in the study.**

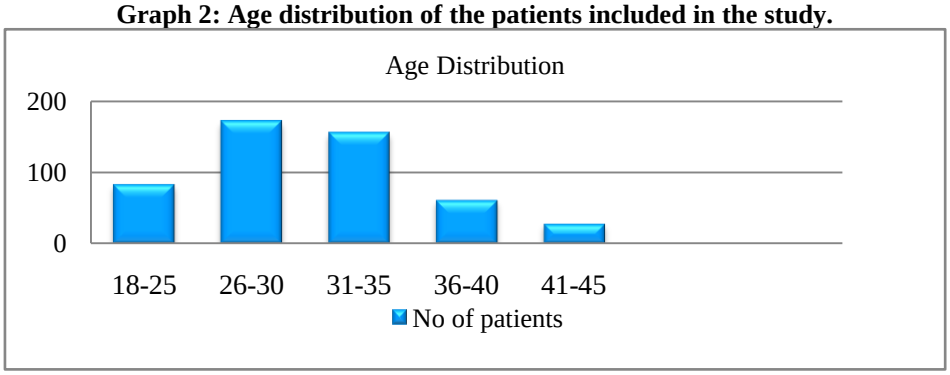



**Table 1 : Tabulation of users and non-users of OCP in reproductive age group.**

| Age group | Total No of patients 500 | Non users 260 | Users 240 | |
|---|---|---|---|---|
| | | | Current OCP users 2 | Former OCP user 168 |
| 18 - 25 | 83 | 42 | 41 | 0 |
| 26 - 30 | 172 | 76 | 65 | 31 |
| 31 - 35 | 156 | 61 | 59 | 36 |
| 36 - 40 | 61 | 53 | 03 | 05 |
| 41 - 45 | 28 | 28 | 0 | 0 |

Study was performed in 500 women between 18 – 45 years of age of which 260 were non OCP users and 240 were users of OCP (of which 30% were former pill users) (GRAPH 1&2,TABLE 1).The ovarian volume was believed to be dependent upon follicle number. The decline in antral follicle size and counts has been directly correlated with a decline in ovarian volume. Decreased ovarian volume and ovarian antral follicle count has been observed in users and former users of oral contraceptive pills.

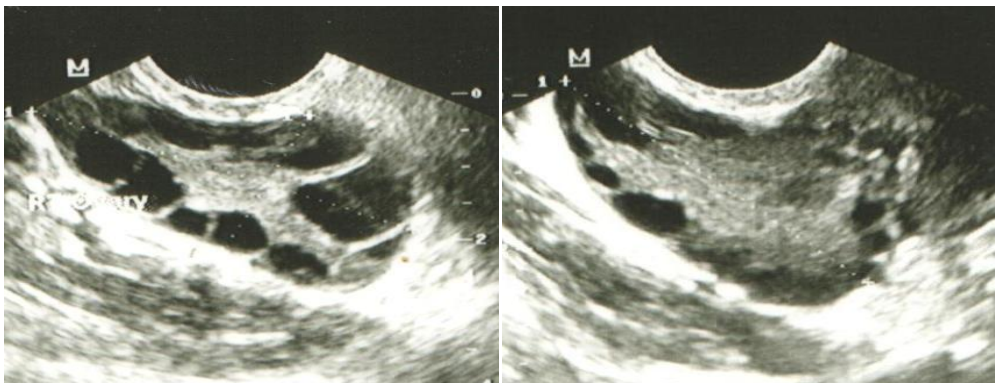


**Figure: 1 (a) & (b): Ovaries of non-users of OCP:** Multiple antral follicles of category intermediate and large are observed in the ovaries of non-users.

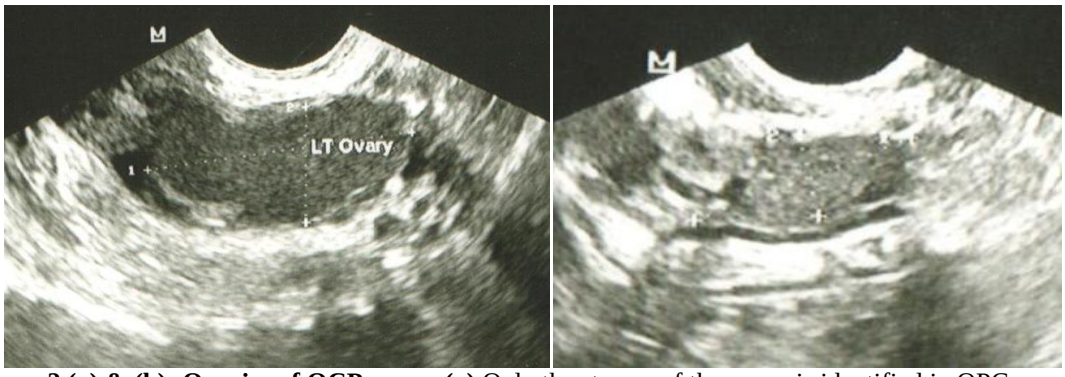



**Figure: 2 (a) & (b): Ovaries of OCP users: (a)** Only the stroma of the ovary is identified in OPC user. **(b)** Very few follicles of category small are identified.

When compared with non users, in oral contraceptive pill users, and former oral contraceptive pill users, the antral follicular counts were reduced by ~ 15 – 20 % and ovarian volume was reduced by ~ 25 – 30 %. When follicle size was further categorized into subclasses (small, intermediate and large), the number of antral follicles was significantly lower in all three antral follicle size categories in users compared with non-users of oral contraception (Fig:1&2). After discontinuation of oral contraceptive pills, 20% of patients conceived after 1 month (after 1st cycle), 75% of patients conceived in and after 1 year (after 4 - 12cycles) (GRAPH 3&TABLE 2).

**Graph 3: Distribution of percentage of OCP users who conceived during the study period.**

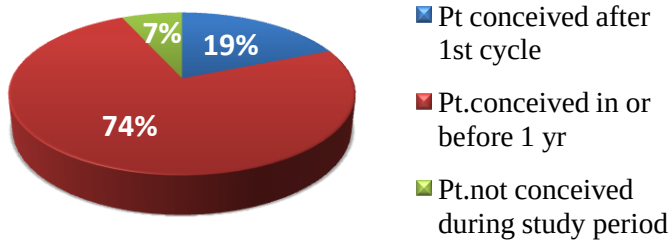



**Table 2: No of conception in OCP pill users during the study period.**

| **Age group** | **30 % former pill user (72 patients)** | | |
|---|---|---|---|
| | 20 % patient conceived (14) | 75 % patient conceived within 1yr (55) | 5 % patient did not conceive during study (3) |
| 18 - 25 | 0 | 0 | 0 |
| 26 - 30 | 11 | 20 | 0 |
| 31 - 35 | 3 | 33 | 0 |
| 36 - 40 | 0 | 2 | 3 |
| 41 - 45 | 0 | 0 | 0 |

## IV. Discussion

Approximately conception occurs at a rate of 20–22% per cycle in women less than the age of 35 years. 50% of non-contraceptive users conceive within 3 months, others over a period of 6 months, 12 months, and within 18 months [2].

This study is based on ovarian reserve parameters from the use of oral contraception in a population of healthy women. Transvaginal sonography usually performed on day 2–5 of menstrual cycle or during withdrawal bleeding. The number of antral follicles identified would be counted and grouped under three size categories [2–4 mm (small), 5–7 mm (intermediate) and 8–10 mm (large)][3]. Ovarian reserve is defined as the number and quality of the follicles left in the ovary at any given time[4]. There is no significant difference between counts of right-sided and left-sided antral follicle within the same individual[5].

The ovarian reserve parameters AFC and ovarian volume were all comparatively lower in users than in non-users of oral contraception. Additionally, there was significant decrease in AFC and ovarian volume with

increasing duration of oral contraception use in current users. Another ovarian reserve marker, serum Anti mullerian hormone concentration was not accounted in this study. Sonographic antral follicular assessment is noninvasive and safe compared to hormonal studies[6]. However, the reductions in Antral follicle count and ovarian volumes, which are probably temporary, should be taken into account when counseling women on their reproductive lifespan as these parameters might improve after termination of oral contraception use.

**1. Advantages of sonographic ovarian reserve assessment:**

Sonographic ovarian reserve assessment is

- Safe,
- Readily available,
- Noninvasive technique,
- Rapid diagnosis,
- Cheaper and cost effective than Anti mullerian hormone (AMH) studies.

## V. Conclusion

This study indicates that sonographic ovarian reserve markers i.e. AFC and ovarian volume, are negatively affected by oral contraception, and are lower in women using oral contraceptive pills and suggests that reproductive life span may be temporarily affected in users of oral contraceptives. Sonographic ovarian reserve still retains its efficacy, as it is safer and cheaper than hormonal studies.

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