

## Study of Atretic and Ovulatory Dominant Follicle in Women undergoing Ovulation Induction in a Tertiary Care Center, Patna

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### Abstract

**Background:** In a typical 28-day cycle, ovulation takes place on day 14, while follicle formation starts on day one when menstruation first starts. The developing antral follicle competes with other follicles for FSH and is dependent on it. The "dominant follicle or leading follicle" is the one that controls this process; all other follicles will atrophy. The "dominant" or antral follicles secrete oestrogen and inhibin, which have a negative feedback effect on FSH and "switch off" the antral follicles nearby. If the hypothalamic-pituitary-ovarian axis activity is properly regulated, the follicular release takes place in a cyclic manner about 14 days before menstruation. The purpose of the present study is to establish the average follicular size (measured in millimetres) on the trigger day most likely to result in ovulation, the day of the menstrual cycle on which hCG trigger was most frequently administered, the relationship between the average antral follicle count (AFC) and the age of the woman visiting the infertility centre, and the average growth rate of ovarian follicles.

**Methods:** This study was conducted in the Department of Anatomy and Department of Reproductive Medicine, Indira Gandhi Institute of Medical Sciences, Patna from December, 2018 to May, 2020(18 months) and approved by the ethical committee of the institute. This was an observational and prospective study. 100 consecutive women undergoing ovulation induction between the ages of 19- 40 have been taken as subjects who attended the Reproductive Medicine at IGIMS for infertility treatment.

**Results:** In a routine folliculometry we deduced the Leading mean follicular diameter has been found to be  $17.56 \pm 1.03$  mm and  $18.73 \pm 1.38$ mm for the right and left ovaries respectively. Day 11th of the Menstrual Cycle was found to be the most common day for administering hCG trigger. A negative relationship has been established between AFC and Age in women and the Mean

growth rate of Ovarian Follicles were  $1.61 \pm 0.29$  mm per day and  $1.34 \pm 0.30$  mm per day for right and left ovaries respectively.

**Conclusion:** The hundred subjects of the reproductive age group 19 – 40 who visited our center in reproductive medicine, 40% were between the ages 28 – 31. Five patients were tested positive for Serum hCG indicating pregnancy. Hence, having a success rate of 5%.

**Keywords:** Antral Follicles, Folliculometry, hCG trigger, Oestrogen

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## Introduction

Of the 60–80 million couples suffering from infertility every year worldwide, approximately between 15 and 20 million (25%) are in India alone. According to a report by the World Health Organization (WHO), one in every four couples in developing countries is affected by infertility [1]. Epidemiological studies estimated the infertility prevalence in reproductive age between 5-30% worldwide [2]. This wide range of prevalence was reported because of different geographical areas with different definitions of infertility, the variety of studied samples and the method of prevalence calculation.

World Health Organization (WHO) defines infertility as “a disease of the reproductive system defined by the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse” [3]. Meanwhile, the WHO’s epidemiologic definition of infertility is defined as “women of reproductive age at risk of becoming pregnant who report unsuccessfully trying for a pregnancy for more than two years” [4].

Follicle development begins on day one which is characterized by the onset of menstruation and ovulation occurs on day 14 (i.e. ovulation) of a typical 28-day cycle. The antral follicle is dependent on FSH and competes with the other developing follicles for FSH. The follicle that dominates this process is called the "dominant follicle or leading follicle" and all others will become atretic. The antral or "dominant" follicles secrete estrogen and inhibin, which exert

negative feedback on FSH, thus "turning off" their neighboring antral follicles. Follicular release occurs around 14 days prior to menstruation in a cyclic pattern if the hypothalamic-pituitary-ovarian axis function is well-regulated [5].

Intrauterine insemination (IUI) is an intermediate stage and easier than other methods of infertility treatment such as In Vitro Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI). IUI is one of the treatments of infertility by cervical factors, anovulation, endometriosis, immunological factors and unknown infertility [6]. Ovulation induction is the method for treating anovulatory infertility. For patients with hypogonadotropic hypogonadism, the treatment involves the administration of both FSH and LH, while HCG is injected for follicle rupture [7].

In the early eighties a new perspective was offered by the advent of Trans vaginal Sonography (TVS), which allows visualization of finer ovarian detail. Follicles as small as 2–3 mm can be visualized with TVS. The major advantages of transvaginal ultrasound scanning (TVS) include a more precise localization and visualization of the ovary allowing early follicles to be examined and followed throughout the cycle [8]. The prevalence of infertility is about 10-15% of the population of reproductive age and several factors are infertility causes such as the maternal age and quality of the oocytes, sperm quality, and infections in women, prevalence of infertility is about 10-15% of

the population of reproductive age and several factors are infertility causes such as the maternal age and quality of the oocytes, sperm quality, infections in women [8].

Assessment of the female genital tract is the basis of the success of any Assisted Reproductive Technology. Ultrasound being the most widely accepted and used modality for the evaluation of the uterus, fallopian tubes and ovaries. Though these pelvic organs can be assessed by three different routes namely Trans-abdominal, Trans-vaginal and Transrectal; the Trans-vaginal route gives best visibility and accuracy of diagnosis [9].

Reasons why the Trans-vaginal route remains the modality of choice for both gynecologist and patients:

- The transvaginal probe can be placed close to these organs – the uterus, tubes and ovaries.
- Trans-vaginal is high resolution and high-frequency probe(6-12MHz).
- The patient does not have to tolerate the inconvenience of a full bladder.

Disadvantage:

- It cannot be used in virgins.
- It is contraindicated in patients having local vaginal infections. Therefore, in these patients trans-abdominal or trans-rectal route is preferable.

Though the trans-rectal resolution is very similar to trans-vaginal, its placement is more painful and needs bowel preparation. The image created by trans-rectal scan is different and difficult to interpret. Trans-abdominal scan has the disadvantage of poor resolution due to the distance of the probe from pelvic organs. Maternal fat, and bowel loops pose other problems [9]. Approximately 42% of ovarian details are missed by trans-abdominal scan [9]. Hence, Transvaginal ultrasound is the modality of choice to study changes occurring in uterus and ovaries during menstrual and ovarian cycles. It has

changed both the accuracy of diagnosis and monitoring of infertility treatments such as ovulation induction.

## Materials and Methods

### Study design and study population

This study was conducted in the Department of Anatomy and Department of Reproductive Medicine, Indira Gandhi Institute of Medical Sciences, Patna and approved by the ethical committee of the institute. This was an observational and prospective study. 100 consecutive women undergoing ovulation induction between the ages of 19- 40 have been taken as subjects who attended the Reproductive Medicine at IGIMS for infertility treatment.

Folliculometry or Follicle Tracking was prescribed as a routine workup of all the cases and these were performed after informed consent of the patient. Under the supervision of senior faculties at Department of Reproductive Medicine, Transvaginal Ultrasonography (TVS) was performed.

### Study setting

The Department of Reproductive Medicine, Ultrasound Room between 11:00 am to 2:00 pm.

### Study duration

December, 2018 to May, 2020 (18 months)

### Inclusion criteria

1. All women of reproductive age between 19 – 40 years seeking fertility treatment.
2. Women attending Reproductive medicine with unexplained infertility.
3. Women with anovulatory infertility – Hypogonadotropic Hypogonadism.
4. With at least one of the Fallopian tubes patent with functioning ovaries.
5. Leading Follicle size >18mm diameter by days 11 to 13 before ovulation induction.

6. Normal semen parameters with motile sperms of male partner.

### Exclusion criteria

1. Women less than 19 or more than 40 yrs.
2. Women taking medications which interfere with reproductive function.
3. Women with abnormalities such as Polycystic ovary syndrome, cysts, desmoids, endometriomas, Hyperprolactinaemia, tumors.
4. Women whose both Fallopian tubes are closed.
5. Male partner has immotile sperms.
6. Size of the leading follicle < 18 mm by days 11 to 13 before ovulation induction, then the cycle is cancelled and the patient is prepared for the next cycle.
7. Natural cycles.

### Study tool

1. History sheets
2. B-mode 2D Ultrasound scans
3. Power Doppler Ultrasound scans

### Study technique

After explaining the procedure and purpose of TVS an informed consent form was signed by the patient, their attendant and me.

A separate Performa for each patient was filled up under following headings:

- Name, age, day of the menstrual cycle, Registration number, address, contact number.
- Antral Follicle count, Diameter of follicle, shape of the follicle, echogenicity of the follicles. (Baseline Scan 2nd,3rd day of menstrual cycle).
- Pre-ovulatory Scan (days 9–13) Diameter of the Graafian/ Leading/ Mature Dominant Follicle, shape of the follicle, echogenicity, look for sonolucent halo

surrounding the follicle, appearance of cumulus 24- 36 hours before ovulation.

d) Luteal Scan days 14-16.

### Method of collection of data

Patient was instructed to empty the bladder before scan and was placed in lithotomy position and covered adequately on a gynecology couch. Ovaries were located taking iliac vessels as landmarks. Maximum follicular diameter was measured on the inner wall. Follicular diameter was the mean of diameters measures in two planes perpendicular to each other (Transverse and Saggital).

### Follicle Tracking or Follicle Monitoring is divided into three phases of menstrual cycle

Daily monitoring was done till sonographic evidence of ovulation took place.

- **Baseline Scan** in early proliferative phase (Day 3 of Menstrual cycle).
- **Preovulatory Scan** (Days 11 to 13)
- **Luteal Scan** (Days 14 to 16) early luteal phase looking for corpus luteum and fluid in the pouch of Douglas.

Couples were counseled for their specific cases e.g. duration of infertility in an OPD setting and investigation for both couples was prescribed.

### Female partner investigation

- BMI was recorded
- Estradiol, FSH, and LH, progesterone and Anti-mullerian Hormone levels, prolactin, and testosterone levels were advised before baseline scans were recorded.
- Histosalpingography for patency test of female reproductive organ in cases of history of pelvic infection, previous ectopic pregnancy etc.

- Patient was asked to visit on day 3 of menstrual cycle for TVS along with investigation results of herself and the partner.

### Male partner investigations

1. Semen analysis

### Ovulation Stimulation Protocol

Chances of pregnancy in infertile couples with ovulation induction and IUI observed a significant increase [10,11]. Clinical pregnancy rate in IUI cycles when using Clomiphene Citrate or another gonadotropin for ovulation induction is about 12% but patients in less than 30 years old and duration of infertility is about 4 years, pregnancy rate increased to 22% [12]. Anna Palatnik *et al* in their study about optimal follicular size recorded 24 hours before triggering found between 23mm- 28mm with higher pregnancy rate achieved compared to patients in whom no induction was carried out. The timing of hCG administration relies on there being at least one follicle greater than 18 mm in mean diameter at ultrasound imaging. This timing is important because premature administration of hCG acts like a premature LH surge and may result in follicular atresia. While, Delayed hCG administration after ovulation has already occurred, would be of no potential benefit [13].

- As a standard protocol at our center women on their first visit were prescribed 2.5 -5 mg of letrozole daily starting on day 3 of cycle for 5 days.
- Ovulation triggering was variably carried out with Gonadotropins in Letrozol (non-steroidal aromatase inhibitor) stimulated

cycles. Ovulation triggering commonly accomplished with hCG was carefully timed by sonographic monitoring usually 24 to 36 hours before ovulation.

- IUI generally follows within 24hrs of provision of the ovulatory trigger.
- Data was recorded in a Performa sheet for each patient for at least 3 cycles until positive serum hCG is obtained.
- At each examination, identities of individual follicles were determined using the ovarian hilus and the locations of neighboring follicles and corpora lutea (CL) as landmarks. Follicles were first imaged in an approximately transverse plane. The image was frozen when the follicle diameter appeared maximal, and the longest and widest follicle dimensions were recorded. The transducer was then rotated 90 degrees to assume an approximately sagittal plane and follicle diameter measurements were again recorded. Mean maximal follicle diameter was determined by averaging the mean of the follicle length and width in the transverse plane by the mean of the follicle length and width in the sagittal plane [14].
- Patients were instructed to obtain a quantitative serum hCG measurement 14 days after the insemination if they did not menstruate to determine positive pregnancy.

### Observations and results

All the results of the sample included in this study have been tabulated in Excel sheet. The data below has been arranged in age group as follow:

**Table 1: Age frequency Vs Number of Patients Seeking Infertility Treatment**

Age in Years	Number of Patients (n=100)
20 - 23	7
24 - 27	24
28- 31	40
32 - 35	24

36 - 39	5
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Most of the females visiting tertiary care center seeking infertility treatment lie in between ages 19 to 40. Above Pie- chart shows that of the 100 patients visiting the tertiary care clinic, 40% fall under the age group 28 to 31 years. Additionally, age group 24 to 27 and 32 to 35 account for 24% each of the total patients visiting the clinic.

**Table 2: Comparison of Day of Trigger versus Age and Number of patients(N=100)**

Day of Trigger	Number of Patients	Age in years (Mean±SD)
D10	11	29.69±3.99
D11	36	29.92±3.9
D12	27	30±4.36
D13	14	26.8±3.12
D14	3	28.67±1.53

Table 2 shows the mean age and total number of patients in relation to the Day of receiving human chorionic gonadotropin trigger for follicular rupture. We reported 91 samples out of 100, since other 9 cycle were canceled due to lack of growth of the follicle to attain >18mm diameter in present cycle among rest two men of reproductive age group between 19–40 years. The above Figure shows that 36 women with mean age 29.92±3.9 received dosage of hCG Trigger on Day 11 of menstrual Cycle which happens to be the highest. Suggesting that most follicles in Letrozole induced cycle attain maturation (Dominant Follicle) on Day 11<sup>th</sup> of Menstrual cycle in present study.

**Table 3: Age Frequency compared to AFC in Rt. Ovary**

Age Group	AFC on Right Ovary(mm)
20-23	11
24-27	9.87
28-31	8.2
32-35	6.12
36-39	5.4

AFC=Antral Follicle Count

Table 3 above depicts how Antral Follicular Count decreases with the increasing age, in women of reproductive age in right ovary. 11 follicles were found on an average in women of reproductive age group 20-23. While, on an average less than 5.4 follicles were found in age group 36- 39.

**Table 4: Age Frequency compared to AFC in Left Ovary**

Age Group	AFC Left Ovary
20-23	9.42
24-27	9.37
28-31	8.07
32-35	6.17
36-39	5.60

Table 4 shows the Antral Follicular Count of the Left side of the ovary in 100 women attending the tertiary care center of Reproductive Medicine at IGIMS, Patna between 2018 December to

2020 May. The Graph clearly depict show with the increasing age, the AFC falls in a linear fashion. The AFC was found to be 9.42 in age group 20-23, and it fell to 5.60 in age group 36-39.

**Table 5: Comparison between AFC of Right Ovary and AFC of Left Ovary**

Age Group	AFC Right Ovary	AFC Left Ovary
20-23	11	9.42
24-27	9.87	9.37
28-31	8.2	8.07
32-35	6.12	6.17
36-39	5.4	5.6

Table5 above shows together AFC of both ovaries simultaneously in relation to age. Red bar depicts Left Ovary and Blue bar depicts Right ovarian AFC respectively.

**Table 6: Day of Trigger with hCG in relation to Mean Dia. of theFollicle**

Dayo f Menstrual Cycle	Mean Follicle Diameter of DFon Right Ovary(mm)with SD
D10	16.14±0.29
D11	17.47±1.56
D12	17.53±1.47
D13	16.48±0.86
D14	17.92±0.27

hCG=Human Chorionic Gonadotropin; DF=Dominant Follicle

Table 6 shows mean of transverse and sagittal follicular diameters taken for all subjects in relation to the Day of hCG trigger they received. Mean follicle diameter reached 17.92±0.27mm for patients who received trigger on Day 14 of their cycle. While, mean follicular diameter was found to be 17.47±1.56 mm to 17.53±1.47 mm on Day11 and Day12 respectively.

**Table 7: Day of Trigger with hCG in relation to Mean Dia. of the Follicle**

Day of Menstrual Cycle	Mean Follicle Diameter of DFon Left Ovary(mm)
D10	16.00±0.43
D11	17.44±1.82
D12	18.20±1.19
D13	19.55±0.41
D14	20.76±0.32

hCG=Human Chorionic Gonadotropin; DF=Dominant Follicle

Table 7 shows mean of transverse and sagittal follicular diameters taken for all subjects in relation to the Day of hCG trigger they received. Mean follicle diameter reached 20.76±0.32mm for patients who received trigger on Day 14 of the cycle which was highest. While, mean follicular diameter was found to be 16.00, 17.44±1.82mm, 18.20±1.19mm and 19.55±0.41mmfor daysD10, D11, D12 and D13 respectively.

**Table 8: Day of Menstrual cycle and Mean dia. of follicle on Rt. Ovary**

Day of M.cycle	Mean Dia. Follicle Rt.	SD about the Mean(mm)
D2	3.6	1.21
D3	5.55	0.9
D5	7.76	1.01

D9	13.5	1.72
D10	14.19	2.01
D11	15.53	2.19
D12	15.6	2.45
D13	17.24	1.13
D14	19	0.63
D15	23	0.45

Table 8 shows how the mean follicular diameter increases as we move from Day 2 to Day 15<sup>th</sup> of menstrual cycle only for the right ovary. On base line Scan on Day 2, the mean diameter of the follicle measured  $3.6 \pm 1.21$ mm. While, in pre-ovulatory scan the mean follicular diameter was found to be  $23 \pm 0.45$ mm for the right ovary.

**Table 9: Day of Menstrual cycle and Mean dia. Of follicle on Rt. Ovary**

Day of M. cycle	Mean Dia.(mm)Lt. follicle	SD about the Mean(mm)
D2	4.55	1.2
D3	4.74	1.17
D5	7.22	1.32
D9	10.54	1.83
D10	13.75	1.9
D11	13.63	2.04
D12	13.68	1.92
D13	15	1.69
D14	17.28	1.05
D15	20.7	2.12

Table 9 shows how the mean follicular diameter increases as we move from Day 2 to Day 15<sup>th</sup> of menstrual cycle measuring size during routine folliculometry only for the left ovary. On base line Scan on Day 2, the mean diameter of the follicle measured  $4.55 \pm 1.20$ mm. While, in pre-ovulatory scan the mean follicular diameter was found to be  $20.70 \pm 2.12$  mm for the right ovary.

**Table 10: Comparison of Mean Follicle Diameter on Rt. And Lt. Side of ovary**

	Mean Diameter Follicle Rt.	Mean Diameter Follicle Left.
D2	3.6	4.55
D3	5.55	4.74
D5	7.76	7.22
D9	13.5	10.54
D10	14.19	13.75
D11	15.53	13.63
D12	15.6	13.68
D13	17.24	15
D14	19	17.28
D15	23	20.7

Table 10 shows the mean follicular diameters of both right and left sides of the ovaries have been depicted side by side in relation to the day of the TVS (Trans Vaginal Sonography) scan. Hence, from the above tabulations:

Mean Diameter calculated on Day 15 - Mean Diameter on Day 3 (mm)



12(days)

Growth Rate of the growing follicle=

Which, was calculated  $=23-3.60 \div 12 = 1.61 \pm 0.29$ mm per day for the Right ovary. Similarly, Growth rate for Left ovarian follicle  $=20.70-4.55 \div 12 = 1.34 \pm 0.30$ mmperday.

**Table 11: Number of Positive Serum hCG in 100Patients**

Age Frequency (Years)	AFC(Total)
23	20
27	21
29	11
27	19
24	22

Among the 100 patients who attended the tertiary care center in Reproductive Medicine at IGIMS, between December of 2018 to May of 2020 only 5 patients tested positive for serum hCG (5% success rate) whose age was found to be 23 to 29 years. Rest were called for next 2cycles until a successful pregnancy was attained indicated by positive serum hCG. After 3 successive cycles of failure to attain pregnancy, patients were advised for Assisted Reproductive Technologies.

**Table 12: Optimal leading follicle size in positive serum hCG among 100 subjects**

AgeFrequency(Years)	LeadingfolliclesizeRightOvary
23	16
27	16.89
29	19
27	18.11
24	17.8
Meandia.±SD	17.56±1.03

**Table 13: Optimal leading follicle size in serum hCG positive among 100 subjects**

Age Frequency (Years)	Leading follicle size Left Ovary
23	18
27	18
29	16.88
27	21
24	18
Mean dia.±SD	18.37±1.38

## Discussion

In this study, we examined the optimal follicular size before hCG administration to treat infertility in IUI cycles stimulated using Letrozole. Erling Ekerhovd [15]in his study “Ovulation induction by means of Letrozole” concluded that Letrozole should become a first line treatment for ovulation induction. In our present study we have used Letrozole as

a standard protocol at our center and women on their first visit were prescribed 2.5 - 5 mg of Letrozole daily starting on day3 of cycle for 5 days for ovulation induction followed by ovulation triggering commonly accomplished with hCG carefully timed by sonographic monitoring usually 24 to 36 hours before ovulation.

The first studies to examine follicular sizes to trigger ovulation were in the 1980s and 1990s, and follicular diameters  $\geq 16$ –18 mm were used as the criteria for hCG administration [16] Kolbe L. Hancock et al [17], November 2020 in a retrospective cohort study concluded that hCG administration at a lead follicle size of 21.1–22.0 mm is associated with higher odds of clinical pregnancy in patients undergoing their first CC-IUI cycles for ovulatory dysfunction explained infertility. In another study carried out by Jacob Farhi, Raoul Orveito et al [18] on 291 infertile women with PCOS and irregular cycles. hCG was administered once the leading follicle reached the size of 17–24 mm found that optimal size of leading follicle was 18–22 mm for positive pregnancy rates. Einat Shalom-Paz, Alicia Marzal et al [19–21] in another study found, in women treated with gonadotropin, the diameter of the leading follicle in the conception cycles ( $18.5 \pm 1.7$  mm) was comparable to that in the non-conception cycles ( $18.2 \pm 1.7$  mm). The pregnancy-related diameter of the leading follicle in CC cycles ( $20.4 \pm 1.2$  mm) was significantly larger than that in gonadotropin cycles ( $18.8 \pm 1.9$  mm;  $p=0.001$ ; 95% CI, -2.2 to -0.9). Ghosh et al. [20] examined cycles with CC and gonadotropins and found that cycles in which the leading follicle was  $\geq 20$  mm were less likely to achieve pregnancy compared with those for which the leading follicles had diameters between 15 and 19.99 mm.

In our present study we found that among the 100 subjects treated under the standard protocol followed at our center with Letrozole stimulated cycles and using gonadotropins and or hCG trigger; 5 subjects were tested positive for serum hCG. Their Mean leading follicle size for both right and left ovaries were found to be  $17.56 \pm 1.03$  mm and  $18.37 \pm 1.38$  mm respectively. Which was in agreement with the studies of researchers, Jacob Farhi, Raoul Orveito et al and Einat

Shalom-Paz, Alicia Marzalet al. had found during their study.

Stamatina Iliodromiti, Carlos Iglesias Sanchez et al [22] in a cross-sectional data from a large prospective cohort study conducted to compare the age-related decline in AFC in infertile and fertile women found that the age-related decline in AFC was much steeper in infertile women compared with that of potential oocyte donors, with an increased prevalence of a low ovarian reserve (AFC < 5) at all ages in infertile women. In another scientific study by Broekmans FJ, Faddy MJ, Scheffer G, te Velde ER [23] titled "Antral follicle counts are related to a great natural fertility loss and age at menopause" in an attempt to represent differences in actual reproductive age among women via ultrasound based AFC of size 2–10 mm found that the link between declining antral follicle counts and reproductively significant events like loss of natural fertility and menopause is strengthened by the high degree of similarity among the predicted and observed age distributions. Furthermore, in another research paper authors Hendriks DJ, Mol BW, Bancsi LF, Te Velde ER, Broekman sFJ. Identified 11 studies on AFC and an updated total of 32 studies on basal FSH from the literature on the basis of preset criteria. The estimated summary receiver operating characteristic (ROC) curves showed AFC to perform well in the prediction of poor ovarian response. Also, showed that prediction of poor ovarian response seemed to be more accurate with AFC compared with basal FSH. The estimated summary ROC curves for the prediction of nonpregnancy indicated a poor performance for both AFC and basal FSH. Similarly, in our present study in order to cite a relationship between AFC and women's age we found that there is a negative relationship as depicted in Figure 3 and 4 of our thesis (Page 5 and 6). 40% Women of reproductive age attending the center were between ages 28–31 years. AFC and Age has a negative relationship as seen in our research

study; ages 20–23 had AFC for right ovary equal to 11 and AFC for left ovary is 9.42. Furthermore, the AFC decreased at age group 36–39 having found that right ovary has an AFC equal to 5.4 and for the left ovary is equal to 5.6. Hence, clearly our study found declining trend of AFC with growing age of women.

Serial transvaginal ultrasonography was performed to measure follicle diameter. Day-to-day growth profiles of individual follicles were determined. Mean growth rates were calculated for ovulatory follicles, which were found to be  $1.61 \pm 0.29$  mm/day for right ovarian follicles and  $1.34 \pm 0.30$  mm/day for left. In a comparison to authors, Angela Bearwald, Roger A. Pierson and Randy A. Walker [14] found that mean follicular growth rate was greater during ovarian stimulation cycles ( $1.69 \pm 0.03$  mm/day) compared to natural ( $1.42 \pm 0.05$  mm/day) and OC cycles ( $1.36 \pm 0.08$  mm/day). The interval from dominant follicle selection to ovulation was shorter during stimulation cycles ( $5.08 \pm 0.07$  days) compared to natural cycles ( $7.16 \pm 0.23$  days). Follicles grew faster during ovarian stimulation therapy compared to natural cycles or OC cycles. In another study researchers N. Carol Dornbluth et al [24] concluded follicles generally increased in size at a rate of 2–3 mm per day and were usually 18 mm in diameter or larger at rupture.

### Conclusion and Summary

The present study confirms that in a routine folliculometry via TVS permits accurate determinations of follicular number and size with multi follicular response throughout menstrual cycle.

In a routine folliculometry we deduced the following:

- Leading mean follicular diameter has been found to be  $17.56 \pm 1.03$  mm and  $18.73 \pm 1.38$  mm for right and left ovaries respectively.

- Day 11<sup>th</sup> of the Menstrual Cycle was found to be most common day for administering hCG trigger.
- A negative relationship has been established between AFC and Age in women.
- Mean growth rate of Ovarian Follicles were  $1.61 \pm 0.29$  mm per day and  $1.34 \pm 0.30$  mm per day for right and left ovaries respectively.

The hundred subjects of the reproductive age group 19–40 who visited our center in reproductive medicine, 40% were between ages 28–31. Five patients tested positive for Serum hCG indicating pregnancy. Hence, having a success rate of 5%.

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