

**Original Article**

## Role of Transvaginal Ultrasound in Infertility: Experience at a Tertiary Care Hospital in Dhaka City

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### Abstract

**Background:** Infertility problem is a global problem and now infertile couples are more aware for the treatment of infertility. Transvaginal sonography since 1995 has expanded the scope of use of ultrasonography in assessment of endometrial thickness, ovarian volume, follicular development in response to hormone in different phase of menstrual cycle in relation to infertility management. In this study it may be assumed that present study may help to establish transvaginal sonography as a new and reliable diagnostic method by which we will be able to proceed accurately with more confidence in diagnosing infertility. **Objectives:** The purpose of the present study was to assess the role of TVS in diagnosing & evaluating causes of infertility and the comparison between clinical correlation and TVS findings in infertility. **Methodology:** It is a Hospital based cross sectional study conducted in outdoor department of Obstetrics and Gynecology in Sir Salimullah Medical College (SSMC) and Mitford Hospital, Dhaka, Bangladesh and in a infertility clinic in Dhaka, from March 2009 to August 2009. Sample size was 98 cases of infertile women. **Result:** Amongst 98 women, 64 cases were represented with primary infertility and 34 patients came with secondary infertility; common age group is 29-35 years; most frequent TVS finding is PCOD with its various presentation and ovarian volume. **Conclusion:** Transvaginal sonography is painless, quicker, costeffective and can be done as a out door patient in the department. It can be used as a first-line diagnostic procedure for infertility in Bangladesh. But it demands costly equipments, special TVS probe as well as expertise of the operator. At present there are few number of IVF centres in some districts of Bangladesh where transvaginal sonography is the most useful procedure and they play an important role in the diagnosis of causes of infertility. [Journal of Science Foundation, July 2017;15(2):41-47]

**Keyword:** Infertility; Transvaginal sonography; TVS; Endometrial thickness; Ovarian volume; Follicular development

### Introduction

Infertility is a problem faced by couples all over the world (Datta 2004). These couples are also aware of some of the treatment options that may be given. In clinical practices, proper counseling, reassurance and taking the help of some diagnostic aids, these couples may be managed. Transvaginal sonography is indispensable in the diagnosis of these couples. The advantages are firstly, uterus, ovaries and fallopian tubes can be imaged with enhanced quality, allowing small structures to be distinguished more clearly.

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Secondly, patients do not need full bladder so there is no scanning delay. The disadvantages are invasiveness and limited field of view not more than 10 cm (Ratnam 2011).

Transvaginal ultrasonography is also helpful in visualization of pathologic lesions of ovary and adnexae, extra ovarian lesions and fallopian tube in an attempt to detect tubal blockage. Association of subfertility and infertility with polycystic ovarian syndrome (PCOS) has made the patient and their doctors more concerned about this condition (Alan and Nathan 1999). These ovaries have a typical sonographic appearance which is better visualized by TVS and is recognized as a large, almost spherical ovary with multiple homogeneous cystic structures (immature or antral follicles <10mm in diameter) crowded along its surface. This finding is quite often described as the 'necklace pattern'. The hallmark of diagnosis of PCOD remains in sonographic identification of hyper echogenic theca in the ovarian substance or surrounding the follicles.

By TVS diagnosis of focal intrauterine lesions, uterine malformations and leiomyomas are easily delineated and nearly approaches the sensitivity of hysteroscopy. Abnormality of uterine cavity may affect fertility by inhibiting implantation. TVS seems very accurate in the diagnosis of presence or extension of frank pelvic inflammatory disease and also promising in augmenting the outpatient diagnosis of PID among patients referred for lower abdominal pain. In addition to these conditions trans-vaginal sonography has also been described in the diagnosis of pelvic abscesses, pelvic mass, endometriomas, hydrosalpinx, intra uterine adhesions (Asherman's syndrome), uterine hypoplasia and other developmental anomalies like mullerian or vaginal agenesis associated with infertility (Caiciatore 1992). In this study it may be assumed that present study may help to establish transvaginal sonography as a new and reliable diagnostic method by which we will be able to proceed accurately with more confidence in diagnosing infertility.

## Methodology

This was a hospital based cross sectional observational study conducted in outdoor department of Obstetrics and Gynecology in Sir Salimullah Medical College (SSMC) & Mitford Hospital, Dhaka, Bangladesh and in an Infertility clinic in Dhaka, from March 2009 to August 2009 for a period of six (06) months. The study was done to evaluate the causes of infertility related problems of pelvic organs, to assess the role of TVS in diagnosing infertility and to compare between clinical correlation and TVS findings in infertility. It will help to develop a protocol for management of infertile patients. The patients seeking advice for infertility were included in this study. Both primary and secondary infertility within 20 to 40 years of aged patients were selected for this study. Couple with any male factor or having medical disorder or known endocrine disorders were excluded from the study. Non-probability/purposive sampling was done from the study population. Patients were selected through short interview applying inclusion and exclusion criteria. Not more than 98 subjects were feasible to include in the study during the study period. A structured questionnaire was designed including all the variables of interest.

## Result

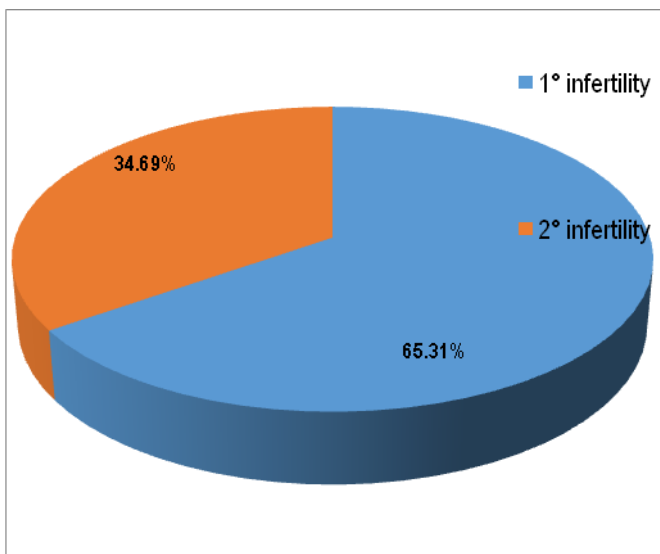
Sample size was 98 cases of infertile women. Amongst 98 women, 64 cases were represented with primary infertility which is 65.31% of the total cases. Thirty-four patients came with secondary infertility which was 34.69% of the total cases.

**Table 1: Age Distribution of the Patient (n=98)**

Age(years)	Frequency	Percentage
19-23	10	10.20
24-28	29	29.59
29-35	41	41.84
36-40	18	18.37
Total	98	100.00

The age of the study patients ranged from 19 to 40 years and grouped into four categories. The number of patients in 36 to 40 years age groups was 18 which was 18.37% of the study. Highest incidence of infertility was prevalent in age grouped within 29 to 35 years of age which was about 41.84% and the second highest

age group (24 to 28 years) was 29.6%. The lowest incidence of infertility was prevalent in age grouped within 19 to 23 years, which was 10.2% of the study (Table 1).



**Figure I: Distribution of different types of infertility (n=98)**

The study included 98 patients, amongst them 64 cases with primary infertility and 34 cases with secondary infertility. In primary infertility the duration of infertility was 01 years to 18 years (mean duration 9.5 years) and in secondary cases the duration of infertility was 02 years to 15 years (mean duration 8.5 years) (Table 2).

**Table 2: Duration of infertility (n=98)**

Type of Infertility	Number of Patient	Duration of Infertility	Mean Duration of Infertility
<b>Primary infertility</b>	64	01 years to 18 years	9.5 years
<b>Secondary infertility</b>	34	02 years to 15 years	8.5 years

Among 98 patients 7 cases were found to have Leiomyoma which is 7.14% of total cases, 9 cases having endometrioma which is 9.18%. 6 cases i.e.6.12% had developmental abnormalities i.e. absent uterus, rudimentary uterus, ovarian agenesis, vaginal agenesis and short vagina. Normal findings of pelvis was found in 18 cases which is 18.36% of total cases. 11 cases had bulky uterus with PID. These groups are 11.22% of total study. Thirty-six cases found to have PCOD, responsible for 36.73% of total number of cases (Table 3).

**Table 3: TVS Findings in Infertile Women (n=98)**

TVS Findings	Frequency	Percentage
Leiomyoma	7	6.86
Endometrioma	9	8.82
Developmental anomaly	6	5.88
Normal study	18	17.64
Bulky uterus with PID	11	10.78
PCOD	36	35.28
Retroverted uterus	4	3.92
Adnexal cyst	05	4.9
Hydrosalpinx	02	1.96
<b>Total</b>	<b>98</b>	<b>98</b>

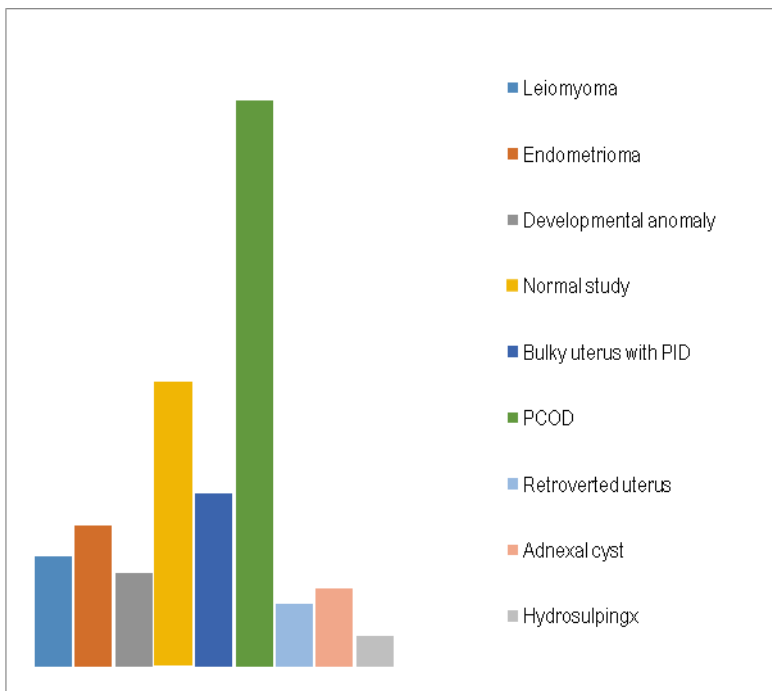


Figure II: TVS findings in Infertile Women (n=98)

Table 4: Comparison between clinical co-relation and TVS findings

Clinical findings	No of patients	TVS findings	Percentage
Endometrioma	15	9	60.0
Developmental anomaly	10	6	60.0
Bulky uterus with PID	18	11	61.1
Leiomyoma	15	7	46.7
Normal findings	27	18	66.7
PCOD	40	36	90.0
Retroverted uterus	08	05	62.5
Adnexal cyst	07	04	57.1
Hydrosulpingx	05	02	40.0

The study included 98 patients. Comparison between clinical correlation and TVS findings were done in which 15 patients clinically seemed to have endometrioma with cyst formation which correlates 9 cases of TVS findings. Remaining 6 cases had normal findings by TVS examination, 10 cases of developmental anomaly had seemed clinically, by TVS findings it was 06. 18 of bulky uterus with PID found by clinical examination, but it was 11 by TVS findings. Leiomyoma was in 15 cases by clinical examination, 7 cases detected by TVS. The study found 27 cases of normal findings of pelvis but by TVS it was 18 cases. PCOD cases was 40 by clinical findings but by TVS examination it was 36.

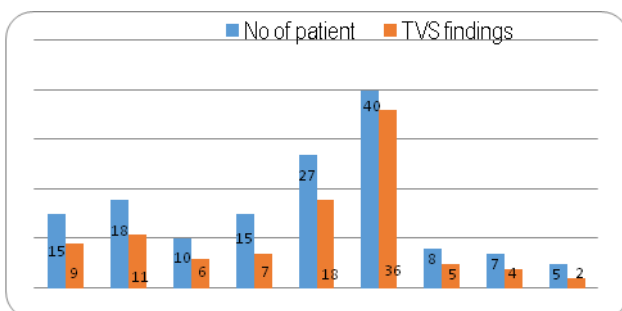


Figure III: Comparison between clinical co-relation and TVS findings

**Table 5: Volume of ovaries of 36 bilateral polycystic ovaries**

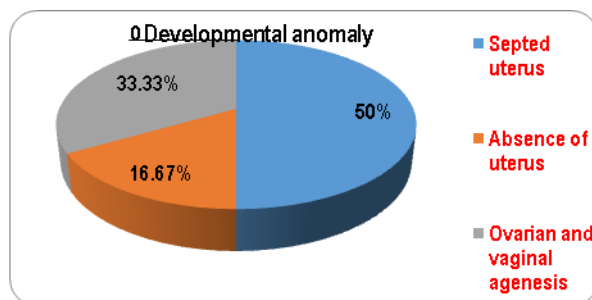
Ovary	Volume in milliliters	Standard Deviation
Right Ovary	15.98	5.32
Left Ovary	14.99	5.25

Volume of ovaries were measured according to a simplified workable formula as follows: Volume=Length x Breadth x Thickness x 0.5. All the measurements were taken in centimeters and Volume expressed in milliliters. Average volume of right ovary was found 15.98ml where that of the left ovary found 14.99ml.

**Table 6: TVS findings of Developmental anomalies**

Developmental anomalies	Noof patients	Percentage (%)
Absence of uterus	01	16.67
Septed uterus	03	50.00
Ovarian & vaginal agenesis	02	33.33
Total	06	100%

In this study total number of developmental anomalies is 06 in which 01 case is due to absence of uterus of 16.67% of total cases. 03 cases of septed uterus is 50% of total study and 02 cases are due to ovarian and vaginal agenesis which is 33.33% of the study.

**Figure IV: Developmental anomalies of ovary, uterus and vagina**

Here out of total leiomyoma 02 cases were in subserous position which is 28.57% of total study. 04 cases in intramurally situated and is of 57.14% of the total cases and submucous case is 01 which is 14.29% of the study.

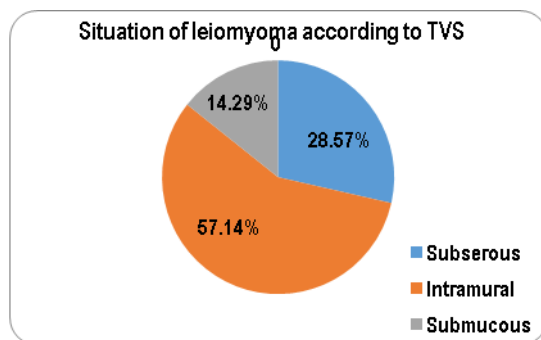
**Table 7: Situation of leiomyoma according to TVS findings**

Situation of leiomyoma	Number of patients	Percentage(%)
Subserous	02	28.57
Intramural	04	57.14
Submucous	01	14.29
Total	07	100%

## Discussion

Infertility is a global issue in reproductive health which affects millions of couples world wide. By proper counseling and assurance with the help of appropriate diagnostic method the exact cause may be detected. In

this study total 98 patients were evaluated by TVS who came in SSMC Mitford Hospital at OPD and in an infertility clinic, Dhaka for the treatment of both primary and secondary infertility. Total 98 patients were divided into four age groups. Highest incidence of infertility was in the age group of 29 to 35 years and total 41 patients were in this group, which was 41.84% of the total patients. 10 patients came within age group of 19-23 years which is 10.20% of total cases. This study included 29 patients within age group of 24 to 28 years which was 29.59% of total cases. Some of the patients came at the age of 36 to 40 years the total number of which is 18 cases and is 18.37% of the study. The mean age group of infertile patients are 29 years. In this study oldest patient was 40 years old and the youngest patient was 19 years old. The study is similar to the study of De Jong et al.<sup>14</sup> who found the highest incidence around 28 years of age group of patients.



**Figure V: Situation of leiomyoma**

In study there were 7 cases of leiomyoma which is about 7.14 of total cases of infertility. Among these 4 were submucous types fibroid polyp, 2 were intramural types small myomas and 1 was subserous types of multiple fibroid in the posterior wall of the uterus. This study having similarity with the study of Fedel et al (1996) who found transvaginal sonography to be 100.0% effective in diagnosing uterine myoma, which is responsible for infertility.

In this study 9(9.18%) patients presented with endometriomas. Here sonographic feature is an excellent predictor for the diagnosis of endometrioma. These low-level echos probably represent degraded blood products associated with cyclic changes occurring during the menstrual cycle. In several cases an irregular hypoechoic region internally corresponding to a more acute phase of haemorrhage. The study has similarity with the study where it has been found 5.0 to 20.0% of women develop endometriosis who consult with their physician for infertility. Sandler and Karol (1978) also found same result.

There is a study among 20 women's who were suffering from adenomyosis. Women were proved to have adenomyosis by MRI. By TVS 9 women were diagnosed as adenomyosis. The incidence of congenital anomaly is difficult to estimate as many women will complete their reproductive life without any knowledge of the anomaly. Sonographic evaluation of internal genitalia shows presence or absence of uterus, ovaries and vagina. The study found 6(6.12%) cases had developmental defects. 01 case was mullerian agenesis and associated with left sided renal agenesis, 3 with uterine anomalies and one with ovarian agenesis.

In this study 4(4.08%) cases of retroverted uterus in these infertile group of patients. 02 cases were fixed retroversion. This might be due to the effect of endometriosis and pelvic inflammatory disease. Jeffciate's report where 10 to 20% patients are within this range. In this study TVS findings was normal in 19 patients. This study included only those patients whose husband's semen analysis is within normal range and no other male factor. These are the unexplained infertility. This report is very near to Jeffciate's<sup>11</sup> report where 10-20.0% patients are within this range.

In this study PID with bulky uterus was found in 11 cases which is 11.22% of the total cases. Amongst them primary infertility cases was 7 and secondary infertility cases was 4 in number. This study has similarity with the findings of Randolph (1986) study. In a study a total of 25 patients of normal cycle were monitored in alternative day to measure follicular size and endometrial thickness by TVS were used to predict ovulation. 17 patients had normal endometrial contour and 20 patients had normal follicular development.

Tubal obstruction is a factor in 20%-40% cases of female infertility. The condition can be diagnosed by sonosalpingography or sonohysterosalpingography with the help of TVS method. This very simple procedure, can be done at OPD without anesthesia with minimum cost. It can help to visualize the patency of fallopian tubes. In this study 11 cases had been diagnosed as a case of PID which is (11.22) of total studies. Randolph et al (1986) found 20% patient had PID which is near about to this result.

Ovarian volume were measured only in the PCOD cases. The average volume of right ovaries were found  $15.98 \pm 5.32$  ml and that of left ovaries were  $14.99 \pm 5.25$  ml. Ashley and Nathan (1997) found the main ovarian volume in patient with PCOD to be  $13.29 \pm 8.76$  ml, which was different statistically from the mean in controls, which was  $10.04 \pm 8.76$  ml. This was confirmed by another study in which the mean volume in PCOD patients was 13.8 ml compared with 7.5 ml in normal controls. So there is similarity with both results.

## Conclusion

Infertility is a sort of disability of women which affects physical and mental wellbeing of the concerned couple and their position. So proper evaluation of the cause is vital. Recently transvaginal sonography has been introduced as an important tool in the diagnosis of infertility. It has also started in our country in some selected centres. The study was done with an object to assess the role of transvaginal sonography as a sensitive detector for the diagnosis of polycystic ovarian disease, endometrioma, leiomyomas, retroversion of uterus, pelvic inflammatory disease, adnexal mass or pelvic tumour, congenital abnormalities of paramesonephric (mullarian) ducts and also its association with renal abnormalities. Transvaginal sonography can be more easily repeated in followup patient for folliculometry. The study can screen the normal ovular patient from the anovular one. Transvaginal sonography is painless, quicker, costeffective and can be done as a out door patient in the department. It can be used as a first-line diagnostic procedure for infertility in Bangladesh. But it demands costly equipments, special TVS probe as well as expertise of the operator. At present there are few number of IVF centres in some districts of Bangladesh where transvaginal sonography is the most useful procedure and they play an important role in the diagnosis of causes of infertility.

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