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Original Research Article

## A clinical analysis of sub-fertile women undergoing diagnostic laparoscopy and hysteroscopy

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### ABSTRACT

**Background:** Diagnostic laparoscopy and hysteroscopy are considered the gold standard for diagnosing pelvic pathology in women among couples with infertility or subfertility. Knowledge of common pathologies in these patients would help plan investigations and deliver better care especially in resource limited settings. The current study was carried out to analyse the clinical-demographic profile and operative findings among women with subfertility undergoing diagnostic laparoscopy-hysteroscopy over a 4 years period.

**Methods:** A retrospective record-based study conducted in the Department of Obstetrics and Gynaecology of People's Hospital, PCMS and RC, Bhopal from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2016 (4 years).

**Results:** Sixty-two records of women with primary/ secondary infertility who underwent diagnostic laparoscopy-hysteroscopy during the study period satisfied the inclusion and exclusion criteria and were analyzed. Among these, 54 (87.09%) couples had primary infertility and 8 (12.9%) had secondary infertility. The mean age of women was 27.1 years (range 20-38 years; SD4.43). One third of women had more than 5 years duration of infertility. Eight (13%) had menstrual abnormalities. One or more tubal abnormality was found on diagnostic laparoscopy in 33.8% of all cases (31.4% of women with primary infertility and 50 % of women with secondary infertility). Pelvic adhesions (25.8%), endometriosis (24.2%) and evidence of acute or chronic pelvic inflammatory disease (19.3%) were the other leading abnormalities.

**Conclusions:** While it is possible to suspect many abnormalities by a detailed history, a good examination and preliminary investigations such as the pelvic ultrasonography, a significant proportion of abnormalities such as the tubal abnormalities, endometriosis and pelvic adhesions can only be detected with certainty on laparoscopy. Hence it is recommended that diagnostic laparoscopy should be an early part of infertility work up.

**Keywords:** Hysteroscopy, Infertility, Laparoscopy

### INTRODUCTION

Infertility or subfertility is a growing concern among the women in the reproductive age group especially with change in lifestyle, late marriages, more women prioritizing career, and delayed child bearing. It is estimated that 10-15% of couples in India suffer from infertility.<sup>1</sup> The cause of infertility remains unidentified in

nearly 10% of cases.<sup>2</sup> Among the identified causative factors: a female factor is identified in about 40-55% of cases, male factor in 30-40% and both partners in 10% of cases.<sup>2</sup> The leading causes among the women include ovulatory problems such as the Polycystic Ovary Syndrome (PCOS) followed by endometriosis.<sup>3</sup> Many of the pathologies that cause infertility may not be diagnosed with certainty by clinical methods, lab

investigations and even by transvaginal ultrasonography. The advent of laparoscopy has made it easier to directly visualize the uterus, fallopian tubes, ovaries and pelvic peritoneum so as to establish the diagnoses. It is indispensable for diagnosing tubal, ovarian and peritoneal factors contributing to infertility and hence is an essential part of infertility diagnostic work-up. Similarly, hysteroscopy allows direct visualization of the uterine cavity, the tubal ostia and the endometrium and is considered an important tool in infertility evaluation.<sup>4</sup> By using the combined aid of diagnostic laparo-hysteroscopy one can easily see the tubal morphology, tubal patency, ovarian morphology, unsuspected pelvic pathology, and uterine cavity abnormalities in a single sitting. Laparoscopy with chromopertubation is considered the 'gold standard' test for tubal assessment.<sup>5-7</sup>

Although infertility is a global medical problem, affecting an estimated 60-80 million couples, the vast majority of them live in low resource countries.<sup>8,9</sup> For the people who come from rural areas with low income it is difficult to seek healthcare for infertility related issues due to high treatment costs, long duration of therapy, frequent visits to the hospital and need to travel long distances for expensive interventions.<sup>10</sup> A knowledge of the common etiological factors in the area served by health care set-ups can help plan investigations more judiciously thereby enable a more efficient utilization of resources. The present study is carried out to get an insight into the spectrum of possible etiological factors for subfertility in our tertiary care set up in central India.

**METHODS**

This is a retrospective record-based study conducted in the Department of Obstetrics and Gynecology of People's Hospital, PCMS and RC, Bhopal, Madhya Pradesh over a period of 4 years i.e. from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2016. The clinical case records of all patients who underwent diagnostic laparo-hysteroscopy for primary and secondary infertility during the above period were analyzed. Incomplete records were excluded from the analysis. The variables studied were age, place of residence: rural/urban, type of infertility, duration of subfertility, endometrial histology, the findings on diagnostic laparo-hysteroscopy and the possible etiological factor(s). The data collected was tabulated in Microsoft Excel sheet. Descriptive statistics in form of range, mean, standard deviation and percentage frequency was used to present and analyze the observations. The study was initiated after obtaining clearance from the Institutional Ethics Committee.

**Definitions used in the study**

*Infertility*

According to WHO, infertility is defined 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 (WHO ICMART).<sup>11</sup>

*Primary infertility*

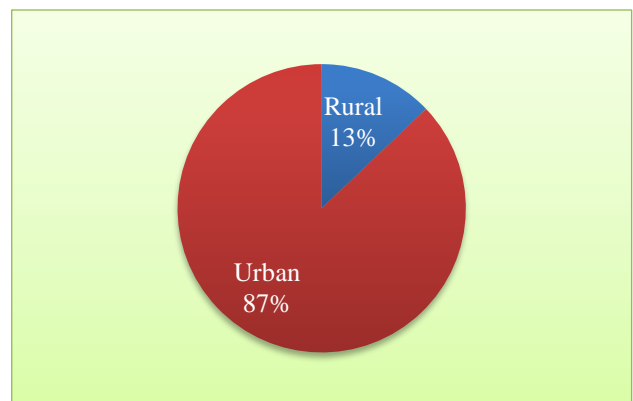
Primary infertility denotes those patients who have never conceived in the past, given the above definition of infertility.

*Secondary infertility*

Secondary infertility indicates previous pregnancy but failure to conceive after 6 months of regular unprotected intercourse.

**RESULTS**

Sixty-two records of women with primary/ secondary infertility who underwent diagnostic laparoscopy-hysteroscopy during the study period satisfied the inclusion and exclusion criteria and were analyzed. Among these, 54 (87.09%) couples had primary infertility and 8 (12.9%) had presented with secondary infertility. Majority (87%) of them resided in urban area and only 13% lived in rural area (Figure 1).



**Figure 1: Residence of women undergoing diagnostic laparoscopy and hysteroscopy.**

The mean age of women undergoing the procedure was 27.1years (Range: 20-38 years; SD: 4.43); the mean age in primary infertility group being 27.74 years and in secondary infertility group being 30.75 years.

**Table 1: Age distribution of women with primary and secondary infertility.**

Age range (years)	No. of women with primary infertility n = 54 (%)	No. of women with secondary infertility n = 8 (%)	Total N=62 (%)
<25	20 (37)	3 (37)	23 (37)
26-30	21 (39)	0	21 (34)
>30	13 (24)	5 (63)	18 (29)
<b>TOTAL</b>	<b>54</b>	<b>8</b>	<b>62 (100)</b>

Majority (76%; 41/54) of women with primary infertility were 30 years or below of age, while majority (62%) of women with secondary infertility were above 30 years of age (Table 1).

Overall, one third of women had more than 5 years duration of infertility. Most (48%) of the women with primary infertility reported with 2-5 years duration of infertility, while 62% women with secondary infertility reported with more than 5 years duration of infertility (Table 2).

**Table 2: Duration of infertility at the time of procedure.**

Duration of infertility at the time of procedure (years)	No. of women in the entire group N = 62 (%)	No. of women with Primary infertility n = 54 (%)	No. of women with Secondary Infertility n=08 (%)
<2 years	11 (18)	11 (20)	0
2-5 years	29 (47)	26 (48)	3 (38)
>5 years	22 (35)	17 (32)	5 (62)
Total	62	54	8

Only 8 women (13%) had complained of menstrual irregularity - five women had oligomenorrhea and three had menorrhagia.

**Table 3: Possible etiological factors based on history and past records in women with primary and secondary subfertility.**

Etiological factors	Entire group - number of women N=62 (%)	Number of women with Primary infertility n=54 (%)	Number of women with Secondary infertility n=8 (%)
History of tuberculosis	10 (16.1)	10 (18.5)	0
PCOS	7 (11.3)	7 (13)	0
Hypothyroidism	5 (8.1)	4 (7.4)	1 (12.5)
Ovarian cyst	2 (3.2)	2 (3.7)	0
Fibroid	2 (3.2)	1 (1.9)	1 (12.5)
DM Type 1	1 (1.6)	1 (1.9)	0
Hydrosalpinx	1 (1.6)	1 (1.9)	0
History of ectopic pregnancy	1 (1.6)	0	1 (12.5)
Uterine anomaly	1 (1.6)	0	1 (12.5)

Prior to the operative procedure, possible etiological factors were identified in some patients based on the history and earlier medical records. The spectrum of possible etiological factors identified in the primary infertility group (n = 54) were a past history of tuberculosis in 18.5%, PCOS in 13% and hypothyroidism

in 7.4%, ovarian cyst in 3.7%, fibroid in 1.9%, diabetes in 1.9% and hydrosalpinx in 1.9%; And those identified in women with secondary infertility (n = 8) were hypothyroidism (12.5%), fibroid (12.5%), history of ectopic pregnancy (12.5%), and uterine anomaly (12.5%). Overall, for the entire group (N = 62), a past history of tuberculosis was the most frequent (16.1%), followed by PCOS (11.3%) and hypothyroidism (8.1%) (Table 3). In 3.22% cases oligospermia was also present in the male partner.

**Table 4: The spectrum of abnormalities visualized during diagnostic laparoscopy in women with infertility.**

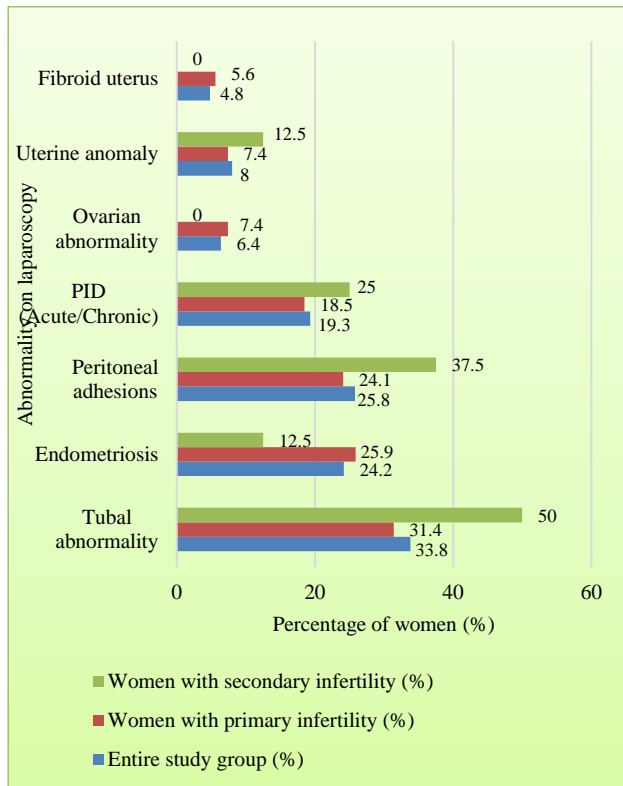
Abnormalities visualized on diagnostic laparoscopy*	No. of women N=62 (%)
<b>Tubal factors*</b>	
B/I tubal block	11 (17.7)
Unilateral tubal block	5 (8.0)
Tubal adhesions	5 (8.0)
Tubal congestion	2 (3.2)
Tubo-ovarian mass	2 (3.2)
Tubal block with beaded appearance	2 (3.2)
Hydrosalpinx	1 (1.6)
Fimbrial cyst agglutination	1(1.6)
<b>Ovarian factors</b>	
Simple cyst	2 (3.2)
Chocolate cyst (endometriosis)	2 (3.2)
Polycystic ovaries	1 (1.6)
<b>Uterine factors</b>	
Uterine malformations	5 (8.0)
Fibroid uterus	3 (4.8)
<b>Peritoneal factors</b>	
Endometriosis	15 (24.2)
Pelvic peritoneal adhesions-minor degree	10 (16.0)
Pelvic peritoneal adhesions-major degree	6 (9.7)
Lesions suggestive of Chlamydial infection/chronic PID	6 (9.7)
Active pelvic infection	6 (9.7)

\*More than one pathology was present in some cases

On diagnostic laparoscopy, the tubal abnormalities were most frequently encountered. The various tubal conditions diagnosed on laparoscopy were tubal block (bilateral in 11 (17.7%) women and unilateral in 5 (8%), tubal adhesions, tubal congestion, beaded tube, tubo-ovarian mass, hydrosalpinx and fimbrial cyst. The complete spectrum of abnormalities visualized during diagnostic laparoscopy is shown in Table 4. One or more tubal abnormality was found in 33.8% of all cases (31.4% of women with primary infertility and 50% of women with secondary infertility), (Figure 2).

The uterine and peritoneal factors identified in the current study were endometriosis in 24.2% women; uterine malformations in 8.06%, minor degree of pelvic peritoneal adhesions in 16%, major degree of peritoneal

adhesions in 9.7%. Lesions suggestive of Chlamydial infection and chronic Pelvic Inflammatory Disease (PID) were seen in 9.7% cases and evidence of acute PID was also seen in 9.7% of cases (Table 4).



**Figure 2: Proportion of women with various abnormalities on Diagnostic laparoscopy: comparative chart of entire study group, women with primary infertility and those with secondary infertility.**

The various ovarian abnormalities detected in laparoscopy were simple ovarian cyst and chocolate cyst (3.2% each), followed by PCOS in 1.6% women.

**Table 5: Endometrium appearance on hysteroscopy in women with infertility.**

Endometrial appearance	Number of women N= 62 (%)
Post menstrual	8 (12.90)
Proliferative	6 (9.67)
Polypoidal	2 (3.22)
Secretory	1 (1.61)
Hyperplasia	1 (1.61)

A comparison of relative proportion of various abnormalities in the entire study group (N=62), the primary infertility group (n=54) and the secondary infertility group (n=8) is depicted in Figure 2. Although a higher proportion of women with secondary infertility had tubal abnormalities and also peritoneal adhesions, the numbers in the secondary infertility group are too small

to draw any statistically significant conclusions. Endometriosis was observed in a higher proportion of women with primary infertility. Overall for all the cases, the highest proportion of abnormalities were tubal abnormalities, peritoneal adhesions, endometriosis and PID (Figure 2). On diagnostic hysteroscopy, the various endometrial changes seen were post menstrual endometrium in 12.09%, proliferative endometrium in 9.67%, polypoidal in 3.2% and hyperplastic and secretory endometrium in 1.61% cases each (Table 5).

**DISCUSSION**

The mean age of women undergoing diagnostic laparoscopy-hysteroscopy was 27.1years in the present study. It is lower than the mean age of women undergoing the procedure as reported in the study by Bhandari et al (28 years).<sup>12</sup> We found the mean age of women with primary infertility to be 27.7 years and those with secondary infertility group to be 30.8 years. The study by Puri et al had women with a higher mean age in the primary infertility group (30±5.2 years) and a similar age range in those with secondary infertility (30±6.1).

Majority of the patients of primary infertility in our study were equal to or less than 30 years of age, whereas majority of women with secondary infertility were more than 30 years of age. This is at a variation from the study by Chimote et al where the most common age group was between 21 to 25 years (41%).<sup>10</sup> However, the age range distribution was quite similar to our study as 36% women in this age range were of primary infertility and 5% were of secondary infertility. Like the present study, it was also noted in a study by Samipa et al that primary infertility rate was much higher (almost twice) in women up to 30 while secondary infertility was more common (1.7 times) in women after age of 30 years.<sup>1</sup>

Majority (87.1%) of women in the present study had primary infertility and only 12.9% women had secondary infertility. The studies by Shah et al and Chimote et al also had a higher proportion of participants with primary infertility (67% women with primary infertility in the former study and 73% in the latter).<sup>1,10</sup>

The proportion of women with infertility who also had menstrual abnormality, such as oligomenorrhoea and menorrhagia, in the present study (13%) was lower than that in the study by Shah et al (23%) who reported 8% oligomenorrhoea, 6% menorrhagia, 4% metrorrhagia, 3% secondary menorrhoea and 2% polymenorrhagia.<sup>1</sup>

A comparative chart of the findings at laparoscopy-hysteroscopy in the present study and some Indian studies is provided in Table 6. Some of the salient points are discussed below. Only 25.8% women had a normal finding on laparoscopy-hysteroscopy in our study. This is similar to the studies Shah et al from Ahmedabad but much lower than the study by Bhandari et al from Indore (47.9% normal).<sup>12</sup>



The proportion of women with tubal abnormalities was higher (50%) among the secondary infertility group compared to the primary infertility group (31.4%) in the present study. This was comparable to the proportion of women with tubal abnormalities reported by Shah et al (45.8%) and Puri et al (38%), but higher than that found by Bhandari et al.<sup>1,2,12</sup> The spectrum of tubal

abnormalities reported in our study was similar to that reported by Shah et al.<sup>1</sup> Bilateral tubal block and unilateral tubal block were present in 17.7% and 8% of our cases respectively. Shah et al found bilateral tubal block in 3% and unilateral block in 13% of cases.<sup>1</sup> The study by Chimote et al reported the presence of bilateral tubal block in 11% of their cases.<sup>10</sup>

**Table 6: Operative findings on laparoscopy in women with infertility in some Indian studies and the present study.**

Operative findings on Laparohysteroscopy	Bhandari et al (2015) N=198	Puri S et al (2012-2013) N= 50	Chimote A et al (2015) N=60	Shah et al (2012-2013) N=100	Present study (2013-2016) N=62
Percentage of primary and secondary infertility	55.1% 44.9%	48% 52%	73% 27%	67% 33%	87.1% 12.9%
Normal	47.9%	-	13%	23%	25.8%
Uterine abnormality	12%	12%	16%	40%	8.06%
Adhesions (including tubal, peritoneal)	17.8%	22%	11%	25%	25.8%
Endometriosis	48.4%	18%	32%	10%	24.2%
Tubal abnormality	21.2%	45.8%	6%	38%	31.4% (pri) 50% (sec)
PCOS	-	22%	19%	12%	1.6%
Ovarian cyst	-	10%	>20%	19%	6.4%

Endometriosis was detected in 24.2% of our cases while the studies by Shah et al, Puri et al and that by Chimote et al detected it in 10%, 18% and 32% respectively.<sup>1,2,10</sup> The proportion of women found to have endometriosis was much higher in the study by Bhandari et al (48.4%).<sup>12</sup> This was perhaps because they studied only the women with unexplained infertility who underwent laparoscopy. Pelvis adhesions were present in nearly one fourth of our case while their proportion was lower in the other studies.<sup>1,2,10,12</sup>

In our study, 8.05% cases had different ovarian pathologies that included simple cyst, and chocolate cyst (3.22% each) and PCO morphology (1.6%) cases. Though the proportion of women found to have PCO morphology on laparoscopy was small in our study compared to other studies, the women diagnosed with PCOS as per prior records and history were in the similar range as other studies (overall 11%; 13% among primary infertility cases). This was perhaps because the other clinical criteria namely the hyperandrogenism and oligo or anovulation may have been satisfied for making the diagnosis. Only 3.2% of our cases had simple ovarian cyst and 3.2% had chocolate cyst. This is much lower than the proportion reported by Chimote et al (25% chocolate cyst).<sup>10</sup>

On hysteroscopy in the present study the various endometrial changes noted were post menstrual endometrium in 12.09% cases, 9.67% cases had proliferative endometrium, polypoidal seen in 3.22%

women followed by hyperplastic and secretory endometrium in 1.61% cases each. Shah et al found a higher proportion of abnormalities on hysteroscopy (40%) that included hyperplasia (15%), myomas (8%), polyp (5%) and adhesions (4%).<sup>1</sup>

## CONCLUSION

While it is possible to suspect many abnormalities by a detailed history, a good examination and preliminary investigations such as the pelvic ultrasonography, a significant proportion of abnormalities such as the tubal abnormalities, endometriosis and pelvic adhesions can only be detected with certainty on laparoscopy. There is no equal alternative to diagnostic laparoscopy in assessing tubal condition and patency. Hysteroscopy further detects abnormalities of endometrium that may be otherwise missed. Hence it is recommended that diagnostic laparoscopy and hysteroscopy should be a part of infertility work up early on rather than at with a delay.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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