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Original Research Article

An observational study of diagnostic hysteroscopy for evaluation of infertility at a tertiary care hospital

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ABSTRACT

Background: Infertility is an illness recognised by the World Health Organisation (WHO) that refers to the inability to achieve a clinical pregnancy after engaging in regular, unprotected sexual intercourse for a period of 12 months or more. The incidence of primary infertility in India ranges from 3.9% to 16.8%. Hysteroscopy has emerged as a crucial technique for diagnosing infertility, providing a direct view of the uterine chamber to detect any possible abnormalities. The objective of this research is to analyse the use of diagnostic hysteroscopy (DHL) in the evaluation of infertility.

Materials and Methods: This research was a retrospective observational study that included 150 female patients who had a previous history of infertility. The study was done from May 2022 to September 2023. Information on the social and demographic characteristics of individuals and their medical history pertaining to infertility were collected and the gathered data were organised in Microsoft Excel. The significance threshold was established at 5% with a significance level of $\alpha = 0.05$.

Results: Out of the 150 patients that received DHL, 89 (59.33%) had primary infertility, whereas 61 (40.67%) had secondary infertility. Laparoscopy detected abnormalities in 35 (39.3%) of the individuals with primary infertility and 26 (42.6%) of the cases with secondary infertility. Abnormalities identified during hysteroscopy were 12 (13.4%) of the individuals with primary infertility and in 6 (9.83%) of the cases with secondary infertility. The prevalent abnormalities detected during hysteroscopy were uterine synechiae, fibroids, and uterine septa. The incidence of tubal obstructions was higher in the primary infertility group compared to the secondary infertility group.

Conclusion: Diagnostic hysteroscopy (DHL) is a very useful method for assessing infertility, namely in identifying adnexal adhesions, endometriosis, and uterine septa. In addition, DHL has the ability to detect several structural abnormalities in the uterus, fallopian tubes, and pelvis, which may assist in formulating suitable treatment strategies. So, both diagnostic and therapeutic intervention can be done at same sitting.

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1. Introduction

Infertility, as defined by the World Health Organisation (WHO), is “a medical condition of the reproductive system that is marked by the failure to establish a clinical pregnancy even after engaging in frequent, unprotected sexual intercourse for a period of 12 months or more”.¹

On a global scale, between 10% to 15% of couples who are capable of reproducing experience infertility. According to estimates from the World Health Organisation, this means that over 60-80 million couples are impacted by infertility globally. According to statistics from the World Health Organisation (WHO), the incidence of primary infertility in India varies between 3.9% and 16.8%.²

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An analysis of Indian census data from 1981, 1991, and 2001 reveals a notable surge in the proportion of married women of reproductive age who do not have children, with the percentage jumping from 13% in 1981 to almost 16% in 2001.³ The prevalence of infertility has been increasing as a result of changes in lifestyle, heightened levels of stress, and a shift towards marrying at a later age.⁴

Conventional pelvic exams and typical diagnostic techniques often fail to detect several pelvic illnesses in women experiencing infertility. Laparoscopy is essential in infertility assessments since it enables direct observation and manipulation of the uterus, fallopian tubes, and ovaries. Moreover, hysteroscopy is crucial in evaluating infertility by offering a direct visualisation of the uterine cavity, facilitating the identification of any possible abnormalities.^{5–7}

This study aims to evaluate the role of diagnostic hysteroscopy (DHL) in the thorough assessment of infertility to facilitate the planning of appropriate care and management strategies.

2. Objective of the Study

The objective of this study was to analyse the role of Diagnostic hysteroscopy (DHL) for evaluation of infertility in a tertiary care hospital.

3. Materials and Methods

A retrospective observational research was undertaken with 150 female patients who had a previous medical condition of infertility. This research was conducted in the Department of Obstetrics and Gynaecology, Akash Institute of Medical Sciences and Research Centre, Devanahalli, Bengaluru, for a duration of 18 months, starting from May 2022 and ending in September 2023. The subjects consisted of couples who were suffering either primary or secondary infertility. They were between the ages of 20 and 40 years, and their infertility durations varied from 1 to 15 years. Furthermore, the research did not include couples with atypical results in their semen analysis.

3.1. Method of collection of data

The research comprised female patients with a previous diagnosis of infertility who visited the Obstetrics and Gynecology outpatient and inpatient departments at Akash Institute of Medical Science & Research Centre in Bengaluru. Prior to the initiation of the investigation, approval was sought from the institutional ethics committee. Primary infertility is characterized by patients who have never experienced conception, while secondary infertility refers to individuals who have had at least one previous pregnancy, regardless of the result.

A Diagnostic Hysteroscopy (DHL) was conducted during the preovulatory phase, namely between days 6 and

11 of the menstrual cycle, while the patient was under general anaesthesia. The method used a 7 mm Karl Storz laparoscope equipped with a telescope that had a deflection angle of 30°. Originally, hysteroscopy was used to inspect the vagina and cervix for irregularities such as growths or polyps, and to evaluate the uterine cavity for septa, congenital deformities, fibrotic bands or synechiae, polyps, fibroids, and the state of the endometrium. Both openings of the fallopian tubes were examined to assess whether they were clear and unobstructed. Following the establishment of pneumoperitoneum, laparoscopy was conducted to inspect the fallopian tubes, ovaries, pelvic peritoneum, pouch of Douglas, and peritoneal cavity for any irregularities.

An examination was conducted on the pelvic cavity and its organs, focusing particularly on the morphology, dimensions, location, and texture of the uterus, as well as the existence of fibroids. An assessment was conducted on the cul-de-sac to identify any adhesions, obliteration, endometriotic nodules, or fluid. An evaluation was conducted on the ovaries to determine their dimensions, configuration, outer appearance, colour, existence of cysts, and their proximity to the fallopian tubes. An examination was conducted on the fallopian tubes to assess their dimensions, configuration, texture, bending, widening, narrowing, or presence of fluid accumulation, with particular attention on finding any characteristics suggestive of infertility. A chromopertubation test (CPT) was conducted to assess the patency of the fallopian tubes bilaterally. The administration of methylene blue dye included the use of a 20 ml syringe to inject it via either a Leech Wilkinson cannula or a 14F Foley catheter that was introduced into the uterine cavity. The catheter bulb was then inflated with 5 ml of normal saline. The confirmation of tubal patency was achieved by seeing the dye flowing out from the fimbrial ends of the fallopian tubes.

3.2. Statistical analysis

The data was gathered and organised in MS Excel. The data has been presented using descriptive statistics. The data was analysed using SPSS (Version 26.0). The significance threshold was set at 5% ($\alpha = 0.05$). Qualitative factors are represented by frequency and percentages, whereas quantitative variables are represented by mean and standard deviation.

4. Results

A total of 150 participants underwent Diagnostic Hysteroscopy (DHL). Among them, 89 (59.33%) had primary infertility, and 61 (40.67%) had secondary infertility (Figure 1). The mean age of patients with primary infertility was 26.9 ± 3.1 years, while the mean age for those with secondary infertility was 31.7 ± 1.9 years. History of dyspareunia was reported by 11 (12.3%) participants in the

primary infertility group and 15 (24.5%) in the secondary infertility group. The mean BMI of participants in the primary infertility group was $25.8 \pm 1.5 \text{ kg/m}^2$, and in the secondary infertility group, it was $24.4 \pm 2.1 \text{ kg/m}^2$. The mean duration of infertility was 3.5 ± 1.5 years for primary infertility and 6.7 ± 2.2 years for secondary infertility (Figure 2). In the primary infertility group, 25 (28.08%) had previously undergone ovulation induction, whereas in the secondary infertility group, 17 (27.86%) had a history of ovulation induction (Table 1).

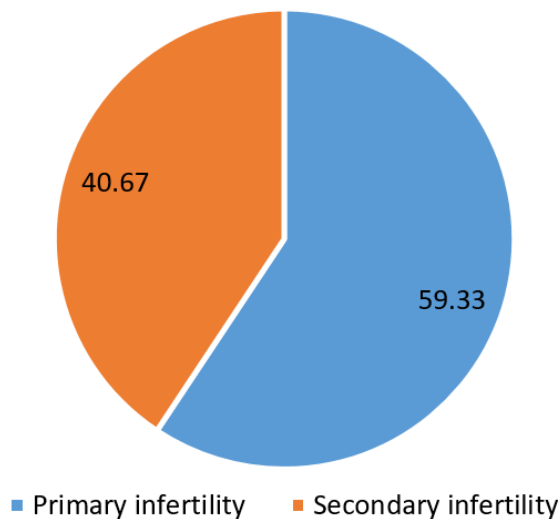


Figure 1: Classification of infertility among patients in a tertiary care hospital (n=150)

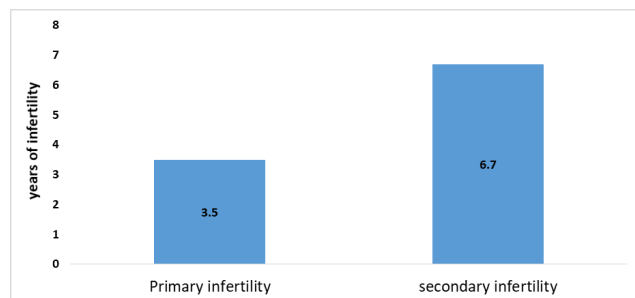


Figure 2: Mean duration of infertility

Table 1: Previous history of patients those undergone ovulation induction [OI] (n=150)

Previous history	Primary infertility (89)	Secondary infertility (61)
OI	25 (28.08%)	17 (27.86%)
IVI	-	-
IVF	-	-

In the current study, laparoscopic abnormalities were more prevalent than hysteroscopic abnormalities. Among primary infertility patients, laparoscopy identified 35 abnormalities (39.3%), while hysteroscopy identified 12 abnormalities (13.4%). Among secondary infertility patients, laparoscopy identified 26 abnormalities (42.6%), while hysteroscopy identified 6 abnormalities (9.83%) (Table 2). Among the patients in the primary infertility group, 18 individuals (20.22%) had more than one aberrant finding during DHL. In the secondary infertility group, 8 patients (13.11%) also had more than one abnormal result. The most prevalent abnormalities seen during laparoscopy in both the primary and secondary infertility groups were Adnexal adhesion (21.33%) and Hydrosalpinx (15.33%), which are types of Pelvic Inflammatory Disease (PID) (Table 3). Out of the patients with primary infertility, 5 (5.61%) showed symptoms indicating TB, such as caseous material in the pelvis and visible tubercles on the fallopian tubes and pelvic serosa. Similarly, out of the patients with secondary infertility, 2 (3.27%) had similar characteristics indicative of tuberculosis (Table 3). The most prevalent abnormalities detected during hysteroscopy were uterine synechiae, fibroids, and uterine septum, as shown in (Table 4). The occurrence of tubal blocks was higher in the primary infertility group compared to the secondary infertility group, as seen in (Table 5). Bilateral blocks were more prevalent than unilateral blocks, as seen in (Table 5). There were no significant complications noticed or reported during or after the surgery. The patient reported experiencing mild stomach discomfort at the surgical location as their only complaint.

5. Discussion

Infertile couples may encounter substantial obstacles, such as financial burden, mental anguish, and strained familial relationships. Studies undertaken by Miller JH et al. and Wallach EE have identified the primary causes of female factor infertility as ovulatory dysfunction (20-30%), uterine pathology (15%), and tubo-peritoneal pathology (30-35%).^{8,9}

Laparoscopy is widely regarded as the most reliable method for identifying infertility-related problems and is a more accurate predictor of the likelihood of natural conception in couples with unexplained infertility.¹⁰ A retrospective research was conducted on 495 infertile women with unexplained infertility, whereby a considerable percentage of abnormalities were detected during laparoscopy done before therapy.¹¹ Consequently, these changes resulted in alterations to the selected treatment plan, emphasising the significance of laparoscopy as a very efficient diagnostic instrument for infertility.

India's primary infertility rate, as reported by the World Health Organisation (WHO), ranges from 3.9% to 16.8%.²

Table 2: Prevalence of hysteroscopic and laparoscopic abnormalities among patients

Findings	Primary infertility (89)		Secondary infertility (61)	
	Normal	Abnormal	Normal	Abnormal
Laparoscopy	54 (60.6%)	35 (39.3%)	35 (57.3%)	26 (42.6%)
Hysteroscopy	77 (86.5%)	12 (13.4%)	55 (90.1%)	6 (9.83%)

Table 3: Laparoscopy findings among infertility patients (n=150)

Findings	Primary infertility (89)	Secondary infertility (61)	Total (150)
Fibroid	6 (6.74%)	2 (3.27%)	8 (5.33%)
Endometriosis	8 (8.98%)	7 (11.47%)	15 (10%)
Adnexal adhesion	17 (19.10%)	15 (24.59%)	32 (21.33%)
Hydrosalpinx	14 (15.73%)	9 (14.75%)	23 (15.33%)
Tubal pathology	4 (4.49%)	3 (4.91%)	7 (4.67%)
Ovarian pathology	9 (10.11%)	12 (19.67%)	21 (14%)
Others	5 (5.61%)	2 (3.27%)	7 (4.67%)

Table 4: Hysteroscopy findings among infertility patients (n=150)

Findings	Primary infertility (89)	Secondary infertility (61)	Total (150)
Fibroid	4 (4.49%)	1 (1.63%)	5 (3.33%)
Polyp	3 (3.37%)	1 (1.63%)	4 (2.67%)
Septum	3 (3.37%)	2 (3.27%)	5 (3.33%)
Synechiae	2 (2.24%)	3 (4.91%)	5 (3.33%)
Others	2 (2.24%)	-	2 (1.33%)

Table 5: Prevalence of tubal block (chromopertubation test) among patients with infertility (n=150)

Findings	Primary infertility (89)	Secondary infertility (61)	Total (150)
Unilateral	20 (22.47%)	9 (14.75%)	29 (19.33%)
Bilateral	35 (39.32%)	20 (32.78%)	55 (36.67%)

In this research, a total of 150 women had Diagnostic Hysterolaparoscopy (DHL) throughout a span of 18 months. Among them, 89 women (59.3%) had primary infertility, while 61 women (40.6%) had secondary infertility. On the other hand, a research conducted by Datti SN et al. found that 92 patients (77.31%) had primary infertility, whereas 28 patients (22.69%) had secondary infertility.¹² In a similar vein, the research conducted by Gambhava et al. revealed that 73% of cases had original infertility, whereas 27% included secondary infertility. These studies together demonstrate that primary infertility is the prevailing kind.¹³

Laparoscopic examinations conducted by Jayakrishnan et al. and Nayak et al. revealed pelvic pathology in 26.8% and 30% of infertile individuals, respectively.^{7,14} In our study, we found pelvic pathology in 36.6% of the patients.

Our research found that adnexal adhesion and hydrosalpinx were the most prevalent tubopelvic disorders among infertile patients, as shown by laparoscopic findings. Adnexal adhesion affected 32 patients (21.3%), while hydrosalpinx affected 23 patients (15.3%). The results of this study are comparable to the findings reported by Chanu et al. On the other hand, research conducted by Nayak et al., Godinjak Z et al., and Tsuji I et al. revealed that endometriosis and adnexal adhesions were the main

abnormalities seen in infertile individuals.^{7,15,16} Our investigation revealed a 10% incidence of endometriosis among the patients, which is similar to the 9.3% prevalence reported by Chanu et al.⁶ In addition, Bano A et al. found that endometriosis is a notable diagnosis, with a frequency of 27% among patients experiencing initial infertility and 13% among those experiencing secondary infertility.⁵

Our investigation found that fibroids, septum, and synechiae were present in 5 individuals each, accounting for 3.33% of the total. Polyps were found in 4 patients, representing 2.67% of those with infertility. Conversely, the research conducted by Datti SN et al. revealed that polyps were present in 6.66% of cases, followed by uterine septum in 5%, and synechiae in 2%.¹² Chanu et al. discovered that the occurrence of septate uterus in infertile patients is rather high, with a prevalence of 8%. This finding suggests that septate uterus is a notable contributing factor to uterine abnormalities in individuals experiencing infertility.⁶ In contrast to our results, Nayak et al. and Kamiński P et al. observed that myomas and polyps were the primary hysteroscopic abnormalities in their respective research.^{7,17}

In our study, 19.3% patients had unilateral tubal block and 36.6% patients had bilateral tubal block in chromopertubation test, where majority were due to primary

infertility. The findings was very similar to Chanu et al where they reported 17.9% and 37.7% with unilateral and bilateral tubal blocks respectively.⁶ However, this was reported less in studies done by Bano A et al.⁵ and Madhuri N et al.,¹⁸ reporting only 6% and 8% bilateral block in the primary infertility group and 13% and 9% among the secondary infertility group respectively.

All the above findings show Diagnostic Hysterosalpingography (DHL) is an important tool for diagnosing abnormalities among infertility patients.

6. Conclusion

Hence, Diagnostic laparoscopy is helpful in identifying pelvic disease and evaluating tubal function, when frequently used in conjunction with hysteroscopy concluding Diagnostic Hysterosalpingography (DHL) as an effective diagnostic tool for patients with infertility especially for detecting adnexal adhesions, endometriosis, and septum in the uterus. Also DHL can identify a range of anatomical anomalies at several locations, including the uterus, tubes, and pelvis, which ultimately helps to plan the management.

7. Source of Funding

None.

8. Conflict of Interest

None.


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